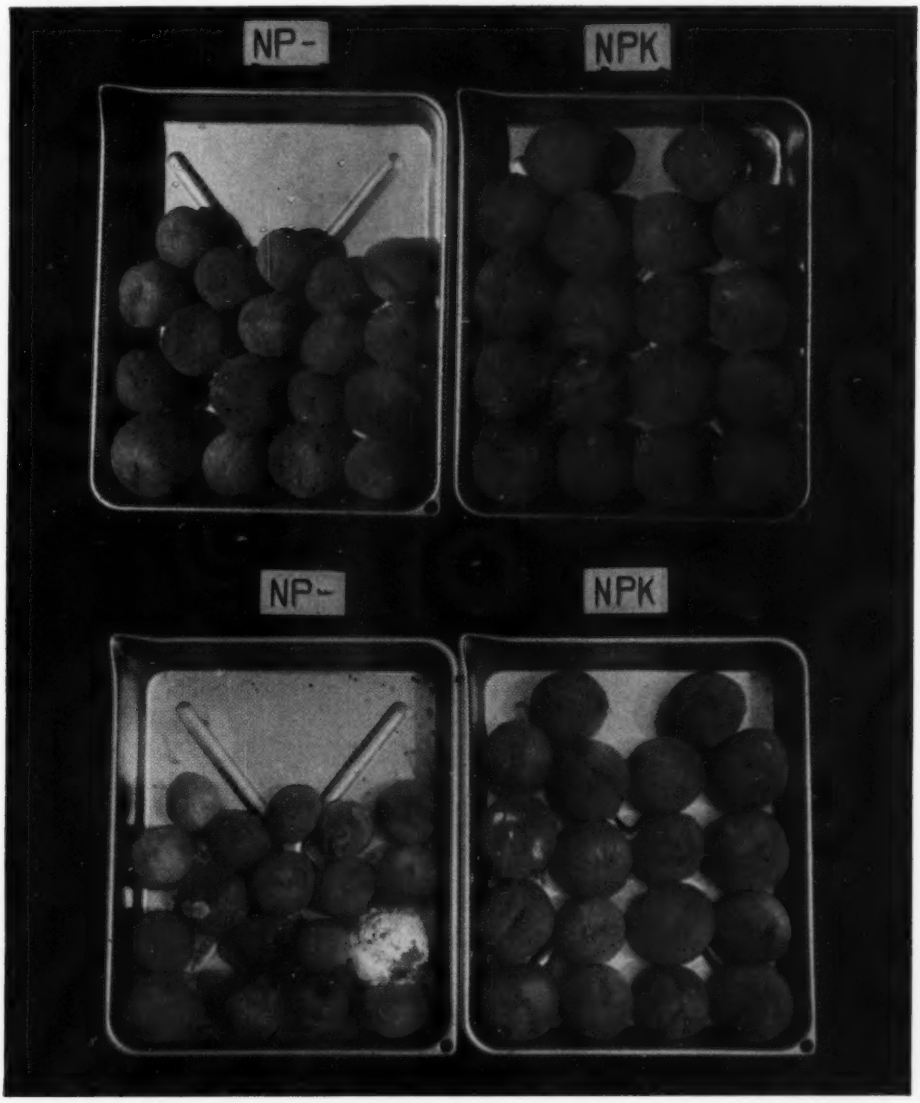
Better Crops WITH PLANT FOOD

May, 1957 10 Cents



Top: 6 days after picking • Bottom: 14 days after picking

grow quality with POTASH!

You name the row crop—and you'll find that it grows better, produces more, brings higher prices, when it is supplied with plenty of *available* Potash.

Nature can go only so far in providing vitally needed Potash. Fast-growing, high-producing crops can easily exhaust the available soil supply—and then it's up to you. That's why it's good business to be sure your fertilizer program includes plenty of POTASH—either in your mixed fertilizers or as a supplemental application.

American Potash & Chemical Corporation is a basic supplier of Potash. Consult your fertilizer dealer today and be sure to specify plenty of TRONA® POTASH, *the vitally needed plant food.*

American Potash & Chemical Corporation

TRONA

Producers of: BORAX • POTASH • SODA ASH • SALT CAKE • LITHIUM • BROMINE • CHLORATES • PERCHLORATES • MANGANESE DIOXIDE • *and a diversified line of specialized agricultural and refrigerant chemicals.*

Offices • 3030 WEST SIXTH STREET, LOS ANGELES 54, CALIFORNIA
99 PARK AVENUE, NEW YORK 16, NEW YORK
235 MONTGOMERY STREET, SAN FRANCISCO 4, CALIFORNIA
1320 S.W. BROADWAY, PORTLAND 1, OREGON
214 WALTON BUILDING, ATLANTA 3, GEORGIA

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

SANTFORD MARTIN, JR., *Editor*

Editorial Office: 1102 16th Street, N. W., Washington 6, D. C.

VOLUME XLI MAY 1957 NO. 5

ON THE COVER THIS MONTH . . .

. . . Nutrient balance affects fruit size and storage qualities. Both pictures show the same lots of peaches at two different times during a storage trial without refrigeration—the top picture 6 days after picking, the bottom one 14 days after picking. On the left are peaches from severely potash-starved trees, on the right peaches from trees that received potash as well as nitrogen and phosphate. In each pan are 18 fruit, typical in size, similar in ripeness as far as the eye could detect. They were placed in pans and not touched again during the storage period. The pans were stored in a darkened basement room with temperatures about 70°F, except when removed for photographing once a week. The larger peaches from potash-starved trees began deteriorating first, as shown here.

Preliminary research during another season on peaches from these same trees showed potash-starved peaches had a higher respiration rate, as measured by the carbon dioxide (CO_2) released during storage. Such peaches seemed to break down faster after picking. This caused some Michigan growers to pick too early because of the expected deterioration—and some buyers to discriminate against peaches from certain orchards because of poor storage qualities. This is not to infer potassium starvation alone causes poor storage qualities in peaches. But low available potassium with a high nitrogen supply seems to cause poor storage qualities, as illustrated. More research is needed to explain the full effect of potassium and other nutrients on fruit quality.

The American Potash Institute, Inc.

1102 16th Street, N. W., Washington 6, D. C.

Member Companies: American Potash & Chemical Corporation • Duval Sulphur & Potash Company • Potash Company of America • Southwest Potash Corporation • United States Potash Company Division of United States Borax & Chemical Corporation

Washington Staff

H. B. Mann, *President*
J. W. Turrentine, *President Emeritus*
J. D. Romaine, *Vice Pres. and Sec'y.*
S. W. Martin, Jr., *Publications*
Mrs. H. N. Hudgins, *Librarian*

Branch Managers

E. T. York, Jr., *Washington, D. C.*
J. F. Reed, *Atlanta, Ga.*
W. L. Nelson, *Lafayette, Ind.*
M. E. McCollam, *San Jose, Calif.*
R. P. Pennington, *Burlington, Ont.*

CONTENTS FOR THIS ISSUE

Turn Over a New Leaf 3

By Jeff McDermid

Taking Guesswork Out of Fertility 8

By James H. Eakin, Jr.

AZALEAS . . . the Glory of Spring 14

By Henry J. Smith

Agriculture, The Great Adventure—II 24

Building Tomato Yields Through Deep-rooted Legumes and Fertilizer Treatment 26

By E. Reeve, R. M. Mroch, R. W. Backes, and R. D. Peel

Of Trees and Profits 35

Fertilizer and Starter Solutions Affect Sweet Potatoes 36

By D. R. Paterson and J. M. Coruthers

". . . ring it, pahdner."

Better Crops with PLANT FOOD

PUBLISHED BY THE AMERICAN POTASH INSTITUTE, INC., 1102 SIXTEENTH STREET, N.W., WASHINGTON 6, D. C., SUBSCRIPTION, $1.00 FOR 12 ISSUES; 10¢ PER COPY. COPYRIGHT, 1957, BY THE AMERICAN POTASH INSTITUTE, INC.

VOL. XLI WASHINGTON, D. C., MAY 1957 NO. 5

Wise tobacco producers . . .

TURN OVER A NEW LEAF

Jeff McDermid

(ELWOOD R. MCINTYRE)

WHAT do you consider the most important changes toward more stability in the "bright" tobacco sections of our Old South?

It's not that spittoons have all but vanished under the great avalanche of cigarette cases and ash trays. It isn't that the tender gender is enjoying the aromatic weed much more than she did when a few old grannies puffed on corn cob meerschaums loaded with "standard" mixtures sharp enough to fry their gums.

It's not just miles of 24-sheet poster boards on our highways or hours of radio and television time expended to give growers and leaf packers a bigger bite of the burning business. Neither is the full answer in twelve generations of sun-browned tobacco producers; nor the staccato voice of the rattle-tongued auctioneer, going along the rows of leafy gold in the split-oak baskets, chanting his ancient message: "66, 66, 66- I hear 67! 7, 7, 7, 67- I got 8, 8, 8, 68! Going at 68, SOLD 68!"

To me, the truest answer is the trend of successful tobacco growers teaming up with soil and plant scientists, with geneticists and market economists—to keep from giving their crops away or "pawning them" with our generous Uncle Sam. In effect, then, quality has replaced quantity in the latest lexicon of the tobacco industry. Accent is now on its acceptance, not its acreage.

Not too long ago, things were different—and also worse. Thin soils, weary and broken planters, every-which-way management, and little cooperation prevailed. With more bad luck, the bottom began to drop out of the reliable export trade. Europe was busted and scarred by World War I. And when an inland farmer loses his share of that historical shipping outlet, even the grits and spareribs lose their zing and flavor, while country hoedowns and revival meetings languish in the miseries.

The first echoes in the piedmont and beyond came from the Washington farm laws of the Thirties, organizing and demonstrating cooperation to the discouraged tobacco boys. Cooperation took hold like a snapping turtle. Almost every line felt it fast—from seed improvement and soil management to marketing quotas. In fact, the first success of these allotments and quotas furnished a brand new lesson to the northern farmers, too. Up there, a few tobacco growers in the binder belts took similar steps to guide their own destiny, and bye and bye some wheat and corn farmers tried it with apologies.

IT BECAME SCIENCE OR SINK . . .

Remember, this emancipation of the tobacco growers accompanied the big new tide of science which came sweeping through the South. A small piece or two of science had been fetched in before by Edmund Ruffen and other agricultural seers, its seeds falling into crannies here and there called "farmers' clubs." But the movement at first wasn't worth shucks, if you take the whole tobacco territory in mind. Like everything practical that seems to be economically infectious, folks had good reason to feel it was "science or sink." So they adopted those laboratory magicians as firmly as they had accepted corn pone, race horses, and coon dogs.

Science has tackled everything. Tobacco aroma, flavor, mildness and burning quality, new varieties are all determined by systematic chemical tests. Many of the big tobacco companies have their own laboratories now. In 1911, the first tobacco analyses by chemical means were started at Richmond, Virginia, by the American Tobacco Company.

Every state claiming tobacco as a major cash crop maintains selective testing staffs of highly trained chemists, plant physiologists, pathologists, and plant breeders. Thousands of soil test plots are conducted on station experimental farms, in cooperation with growers and manufacturers. Soil specialists and their extension service cohorts discover and relay findings to the growers on suitable types and amounts of plant food for the best quality leaf.

So, we have come a long way from the haphazard guessing games used by pioneer tobacco planters when Europe looked to America for all its smoking, chewing, and snuffing tobacco—boosted so well by Sir Walter Raleigh and Prince Albert. Now the export trade depends as

much as domestic buyers on standardized blends of the special types of cigarette tobacco which the overseas consumers like best in the "fags."

But once more the flue-cured tobacco growers face a new dilemma. It is one that will test their continued ability to keep acreage and market in line to prevent oversupply, and also tax their sense of values in furnishing the quality and grade of leaf that sells the best. Too much leaf that nobody wants but Uncle Sam—whose warehouses took 20 per cent of the gross sales from the 1956 crop! In the past two seasons, a third of a normal crop has been dished up in excess of market quotas. Also, more cigarettes are being made per pound of tobacco. This is because filter-tip brands are growing in volume. They take less leaf to make and utilize qualities and grades of tobacco different from non-filter brands.

In 1956, a 12 per cent cut in acreage allotments was ordered. So, with tobacco farmers being top-notch producers, acre-yields soared to an all-time peak. And Uncle Sam stepped up to the baskets to take 700 million pounds of unneeded leaf. Exports had been better, though, which was some comfort. Naturally, the government asked for an extra 20 per cent cut in acreage for this year. That lit the fires for another "burning" question.

. . . AND THE GROWER'S GOOD JUDGMENT

Meanwhile, foreign buyers want flue-cured leaf of special body, flavor, and aroma. This forces competition on the domestic market for the stronger flavored and aromatic kinds. To meet it is the problem—aggravated by a much larger supply of thin, mild, and less aromatic leaf turned in by growers. This has added to the drag on standard qualities which brought the best prices not long ago, but which are now relatively unsought.

Carolina and Virginia growers see a possible way out, an incentive to further production by a limited culture of aromatic tobaccos for blends. Aromatic tobacco takes no official production quota. That's because total home output of it last year was half a million pounds, only about one per cent of what manufacturers want. But they are going to make sure, going to avoid putting it out on sandy soils, going to choose clay lands instead, using fertilizers high in phosphates and potash.

Varieties that have been accused of yielding too high a proportion of poor market sorts are in for a drastic culling. The mystic indicators, "139," "140," "244," are the condemned varieties. The law may even match this year's regulation, which is that 1957 support prices be reduced 50 per cent on leaf sold from any of these least desirable varieties. All this points to a new goal for the growers—quality and saleability rather than mere quantity, regardless.

But you can bank on the good judgment of tobacco growers caught in a temporary squeeze. They are bound to grow varieties which tend

to insure good body, flavor, and aroma. They are advised to use normal rates of fertilizers of grades best suited to individual fields, soils, and crop rotations. They won't overcrowd plants, by regulating the spacing of plants 22 to 26 inches in the rows and in rows 3½ to 4 feet apart. They intend to top medium high, to remove fewer leaves, and to use hand work or oil emulsions and sprays to control suckering.

Farmers of almost every land and clime have found that skill and science, seasonal jobs well done, and sound future planning all pay in protecting crops from adverse conditions. Insects, weeds, diseases, hunger—all threaten growing crops and must be forestalled. In the culture of a quality product like flue-cured tobacco, there is even more need for protective and incentive measures applied to the plants on schedule. A little that means a lot is worth more attention than a lot that amounts to little.

All of this simply means that agriculture will be doing business at the same old tobacco stand through this season, aiming to furnish that intangible something which announcers try so hard to describe—that intangible something for which consumers ask when they buy another carton.

Rebuilding Your Pasture

A TEN-STEP pasture rebuilding campaign—started in the summer—can transform worn-out sod patches into productive dairy cattle feeding areas for summers to come.

Vic Burcalow, University of Wisconsin Agronomist, says the late summer and early fall months are the time to start giving old pastures the "shot in the arm" treatment necessary to make them pay off.

This is the renovation procedure he recommends:

1. Pick an area large enough for a planned pasture system. Select fields that will justify lime, fertilizer, and seeding costs.

2. Kill thistles and other perennial weeds with chemicals. Mow rag weeds and other annuals before they go to seed.

3. Test the soil for lime, phosphate, and potash needs.

4. Spread lime and fertilizer before disking and digging the sod.

5. Overgraze with young stock or dry cattle the area to be renovated. With the old grass removed, disking will be easier.

6. Use a sharp and heavily weighted disk. It must cut through about four inches of sod. Make the first disking up and down the hill, and the second on the contour.

7. Work the old sod at 10-day or two-week intervals until the ground freezes. After the initial disking, use a quack digger to tear the sod loose. This will kill the sod quicker. Make the final digging on the contour and leave a rough surface.

8. Wind up the seedbed preparation with two diskings next spring.

9. Use plenty of fertilizer. Start with 400 to 600 pounds of 0-20-20 or 0-10-30 per acre and topdress later with 0-0-60 or 0-10-30.

10. Seed a mixture of six to eight pounds alfalfa, six to eight pounds of brome, and a half pound of ladino with a bushel and a half of oats as a companion crop. That mixture will work well for pasture, hay, or grass silage.

CORN KING CITES 3 FACTORS

- **Good Seed Selection**
- **Good Soil Management**
- **Plenty of Fertilizer**

THE man who won the 1956 Corn King title of America reports that his victory was due to three main factors: Good seed selection; good soil management; and plenty of fertilizer.

Walter J. Harpel, of Crawfordsville, Indiana, says that his prize-winning 10-ear exhibit came from a hybrid seed strain developed at Purdue University. It is called Indiana Certified 844-D. His corn took first honors among several thousand entries at the recent International Grain and Hay Show in Chicago.

Harpel who grows hybrid seed corn on his 300-acre farm in Montgomery county, Ind., produced championship corn on a 150-acre field of leased land. This land was in an alfalfa-clover crop last year. It was plowed down after grazing, with plenty of topgrowth left to build organic matter.

Over the years the soil has had steady applications of plant food, based on soil tests. It regularly receives a plow-down application of 500 to 600 pounds of mixed fertilizer, such as 4-16-16.

At corn planting time last spring, Harpel added 200 pounds of 4-16-16 in the row.

He reports that the soil's good structure and drainage and its good supply of organic matter, were big assets during the 1956 growing seasons. Heavy spring rains brought 12 inches of water in one 10-day period last May and threatened to drown out the corn corp. But the porous soil soaked up the moisture and held a good deal of it for the corn crop during the dry summer months.

Harpel is a two-time winner at the Chicago show. He was Corn King back in 1947. He reports that this year's corn yield averaged better than 100 bushels per acre. One 5-acre plot checked out at 150 bushels per acre.

TAKING GUESSWORK OUT

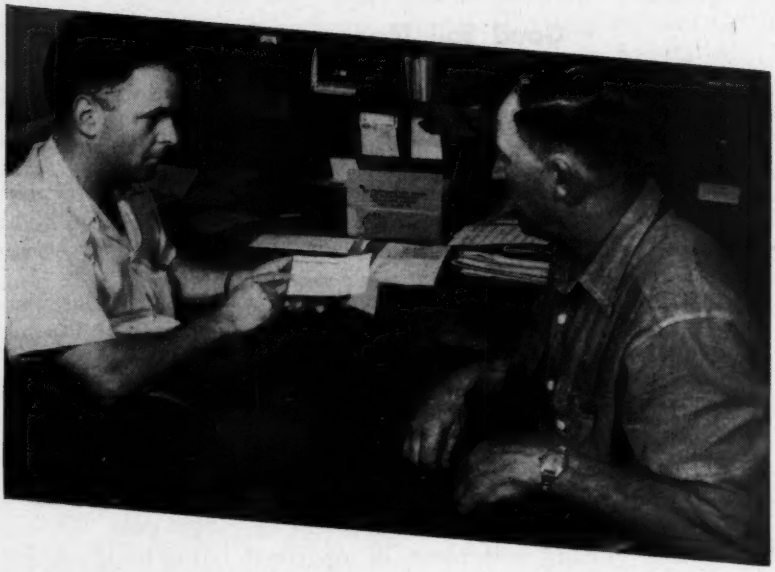


Fig. 1. Farmers are encouraged to discuss their soil fertility problems with the county agent before sending soil samples to the University laboratory.

By James H. Eakin, Jr. • **Agronomy Extension**

Pennsylvania State University

THE agriculture of Pennsylvania is a study of contrasts—contrasts due mainly to great variations in topography, soils, climate, and systems of crop production. To study these contrasts, we could start with the most productive area of the state, the gently rolling hills of southeastern Pennsylvania.

The center of this area is famous Lancaster County, home of the Pennsylvania Dutch. Few areas of the nation have more potentially productive soils, better climate, or better markets than southeastern Pennsylvania. This section has been farmed longer than most other areas of inland United States. Much of its land has been under the plow over 250 years.

The development and expansion of a state soil-testing program has made it possible to characterize certain soil conditions existing in the major farming areas over the state. This informa-

OF FERTILITY

tion, in many cases, has been useful in pointing out soil problems or specific deficiencies in the major geographical regions. It is taking guesswork out of fertility.

For example, summaries of the samples analyzed by the Pennsylvania State Laboratory show soils in certain regions predominantly low or high in organic matter (Fig. 1); Acid or well-limed (Fig. 2); Low or high in phosphorus (Fig. 3).

Within a given county, however, regardless of the geographical location, organic matter, pH, and phosphorus levels may range from very low to very high. Distribution of levels by counties of the northern and southern regions of the state are shown in Tables I through IV.

Soil Structure and Organic Matter

Most counties of southeastern Pennsylvania have fallen victim to the kind of rotation that is heavy with row crops and poor on fertilization. Such rotations as corn, tobacco, barley, wheat and hay along with other structure-destroying practices have cut the organic content of many relatively heavy soils to less than 1.5%, while pulverizing good soil structure into little or no structure. In many cases, it is not necessarily low organic matter, but simply overworked seedbeds. Much needs to be done in this area to educate farmers not to pulverize seedbeds for such crops as corn and potatoes.

Crop yields have increased over the years—through fuller fertilization, better crop varieties, and chemical weed control. Such higher yielding crops require more water to support their growing yields. At the same time, however, organic matter levels are slowly dropping. This means the soil is slowly losing its ability to deliver water to a potentially higher yielding crop.

With water-holding capacity dropping and yields tending to increase, a point is usually reached where poor soil physical condition cancels out improved cultural practices. The answer to this problem is obvious. The sod crop will play a vital role in keeping production levels high in this region. Rotations should include more *forage crops*, and proper tillage methods should be emphasized to maintain better soil structure.

James H. Eakin, Jr., an Ohio native, is Associate Professor of Agronomy at Pennsylvania State University. He took his undergraduate and graduate work at Ohio State, teaching the basic course there. He is now Chairman of the Soil Test Steering Committee at Penn State.

Soil acidity is a basic problem. Nothing is more basic and important to the average farm in the rugged northern and western areas of the state than its liming program. Although lime has been used extensively for almost 100 years, much can and should be accomplished in the future. Progress has been made in the past few years by placing the lime problem at the top of the list. Everyone from dairy specialists to farm management specialists talk lime and its proper use.

Nearly every county in the state has a potentiometer for determining the pH and lime requirement of local soils.

In the past three years, county agents have run almost 300,000 soil tests for lime needs—causing more

Table I. Distribution of organic matter levels in certain counties*

Northern Counties	% VL	% L	% M	% H	% VH	Fertility** Index
County A	0	2.1	3.9	68.3	25.7	4.18
County B	0	.7	9.2	69.7	20.4	4.10
County C	.5	1.4	9.0	71.8	17.3	4.04
Southern Counties						
County A	18.6	32.8	29.1	18.8	.70	2.50
County B	20.2	31.7	24.7	22.7	.70	2.50
County C	16.1	36.3	27.5	19.9	.20	2.52

* Percentage of soil samples testing very low to very high in organic matter.
** Fertility index is a weighted index of the fertility level, used to designate the rank of any county in relation to others.

lime to be used in areas where acid soils predominate and focusing attention on high pH levels where over-liming is a common practice.

Lime needs in Pennsylvania vary greatly. For example, 80% of the soils in a northeastern county test pH values of 5.9 and below. In an eastern county, 51% of the soils test above pH 7.0. It is interesting to visualize what could be done in Pennsylvania if the extremely acid soil areas of the state were all limed according to soil tests. It would, also, be interesting to tally the money spent for lime on soils with pH values of 7.0 or above.

The Greatest Limiting Factor to Crop Production

Last year, 1956, the famous Jordan plots at Pennsylvania State University pointed out the phosphorus problem. The plots which had received nothing but nitrogen or potash alone for the last 76 years yielded less than 30 bushels per acre of very poor quality corn. The plots which had received nothing but phosphorus for the same period yielded 80 bushels per acre of good quality corn. All plots had been limed. Half the Jordan plots, we might add, were fertilized according

Table II. Distribution of pH levels in certain counties.

Northwestern Region	% 5.0 and below	% 5.1-5.5	% 5.6-6.0	% 6.1-7.0	% 7.1 and above	Fertility* Index
County A	28.6	23.8	9.5	38.1	0	2.57
County B	10.0	30.9	26.9	27.7	4.5	2.87
County C	9.0	22.1	23.4	40.0	5.5	3.11
Southeastern Region						
County A	.50	.20	3.3	44.5	51.5	4.45
County B	.50	1.3	6.8	54.9	36.5	4.25
County C	0	2.0	9.1	51.7	37.2	4.24

* Fertility index is a weighted index of the fertility level, used to designate the rank of any county in relation to others.

Table III. Distribution of phosphorus levels in certain counties.

Northwestern Region	% VL	% L	% M	% H	% VH	Fertility* Index
County A	73.1	18.3	7.0	1.3	.3	1.34
County B	68.1	19.1	9.3	3.2	0.3	1.49
County C	69.8	15.4	11.2	3.2	0.4	1.49
Southeastern Region						
County A	17.6	19.8	29.2	26.4	7.0	2.84
County B	24.3	24.3	24.9	20.8	5.7	2.60
County C	18.0	31.8	28.7	19.5	1.0	2.53

* Fertility index is a weighted index of the fertility level, used to designate the rank of any county in relation to others.

to soil test. A plot which had never received any fertilizer yielded 29 bushels per acre of poor quality corn. The other half of this plot when fertilized according to soil test, yielded 128 bushels per acre of excellent quality corn.

Phosphorus is so limiting in northern and western Pennsylvania that 90 to 95% of all soils in many counties test low or very low in available phosphorus. The practice of liming by test, and applying phosphated manure, is still the backbone of many successful soil fertility programs used in Pennsylvania. This basic program must be supplemented with mixed fertilizers, though the foundation is still lime and superphosphate.

Potassium Levels Are Variable

As one Pennsylvania potato grower put it, "I would not attempt to fertilize a potato crop without a soil test." A soil test for potassium alone would be well worth the time, since a potato field in Pennsylvania might contain 30 lbs. to 1,500 lbs. per acre of exchangeable potassium. The situation is so variable, in fact, that a simplified map of potash levels could not be presented for this article.

For example, in Lehigh County in the southeast, only 23% of its soils tested low to very low in potassium. Next door in Bucks County, 68% tested

Table IV. Distribution of potassium levels in certain counties*

Northern Counties	% VL	% L	% M	% H	% VH	Fertility** Index
County A	30.0	42.4	19.9	5.1	2.5	2.07
County B	10.3	35.9	28.5	16.4	8.8	2.78
Southern Counties						
County A	3.3	20.1	26.4	23.7	26.6	3.51
County B	24.8	43.2	18.5	7.7	5.7	2.26

* Percentage of soil samples testing very low to very high in potassium.
** Fertility index is a weighted index of the fertility level, used to designate the rank of any county in relations to others.

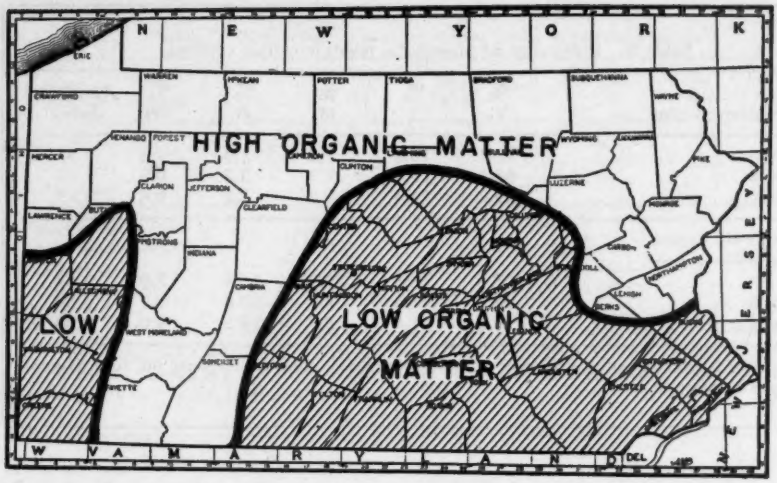


Fig. 2. The most potentially productive farmland in the state—southeastern Pennsylvania—has the lowest organic matter.

low or very low in potassium. In one county, farmers might be applying more potash than they need. In the next county, soil tests show they are not applying enough potash. The problem becomes even more complex when old abandoned fields may contain three times as much exchangeable potash as the regularly rotated and manured field just over the fence.

With such widely differing levels of potassium in Pennsylvania, the soil test is an invaluable tool on which to base sound fertilizer recommendations.

Recommendations Based on Pilot Farms and I.B.M. Surveys

Soil testing in Pennsylvania is directed by a "Soil Test Steering Committee" composed of research and extension personnel concerned with soil testing.

The department of Agronomy Extension, along with various county

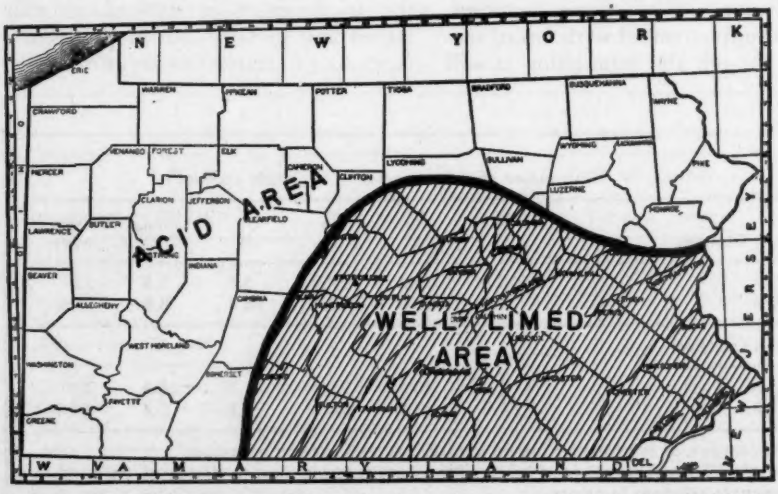


Fig. 3. The well-limed area of Pennsylvania is closely correlated to the availability of limestone in this area.

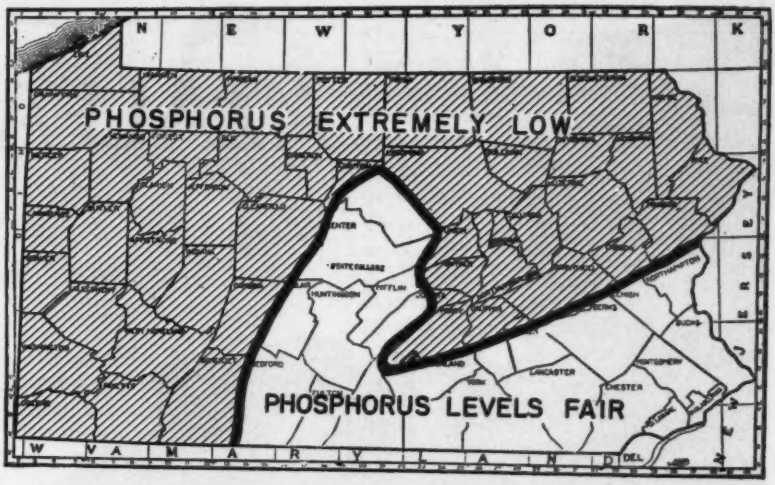


Fig. 4. Phosphorus is the greatest limiting plant nutrient to crop production in much of Pennsylvania.

agents, works closely with a number of soil test pilot farms located in various ecological sections of the state. Each field on these farms is carefully tested at least once a year. Cost account records are kept and summarized at regular intervals. Though most of the farms are "general" farms, some grow sweet corn, some grow commercial hay or are grassland farms. The most recently acquired farm is a "Nitrogen Test Demonstration Farm." No legumes are grown on this farm. The straight grass fields are fertilized with soluble nitrogen fertilizers.

After each 30,000 samples are tested, the results are tabulated by code on punch cards and run through IBM for soil fertility surveys.

Fixed Costs and Soil Tests

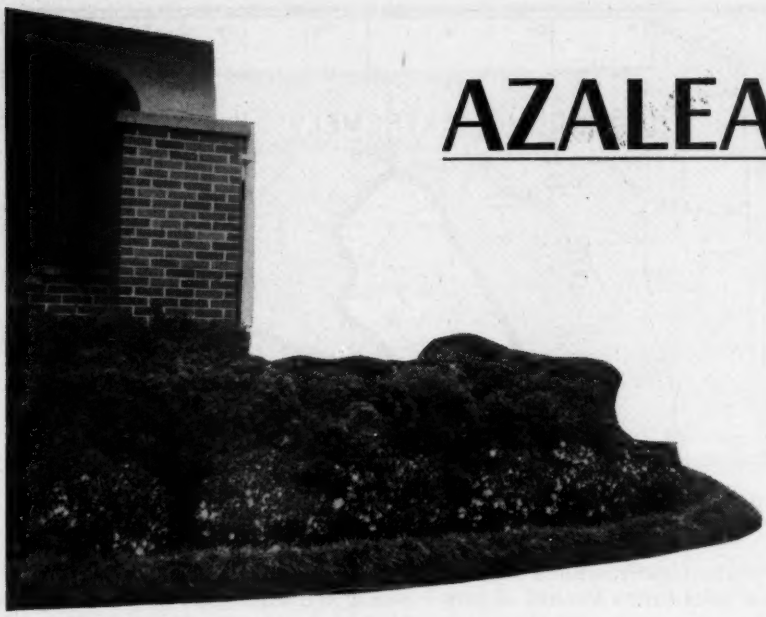
One of agriculture's greatest problems today is the high fixed costs of production. In southeastern Pennsylvania, the fixed costs of producing an acre of corn is approximately fifty dollars. Add ten dollars for fertilizer and the farmer must produce 40 bushels per acre of $1.50 corn to break even.

The high costs of farming today will not permit low *or even average yields.* Low crop yields appear in the high cost of producing a bushel of corn, a ton of hay, a pound of protein. If the cost of feed production is too high, the cost of producing a can of milk or a pound of beef will be too high. If the cost of production exceeds the selling price of the finished product, the business must fold or become marginal. These are simple, hard economic facts.

High yields produced efficiently have never been more important to the economic welfare of farmers. High yields based on reliable soil tests should push the "age of guesswork" into past history. ◄ ◄ ◄

A PRECIOUS RESOURCE

Water is rapidly becoming our most precious natural resource, just as it can be, when neglected, a destroyer of both life and wealth. . . . Each of our great river valleys should be considered as a whole. Piecemeal operations within each lesser drainage area can be self-defeating or, at the very least, needlessly expensive. (President Eisenhower in his State of the Union Address on 10 January).



AZALEAS

. . . the Glory of Spring

By Henry J. Smith

Agricultural Extension Service • Mississippi State College

PERHAPS no other single genus of plants attracts as much attention as the azalea in nature's spring floral display. This genus is so interwoven with rhododendron that they are usually considered the same—though nurserymen refer to the deciduous forms as azaleas, the evergreen forms as rhododendrons.

There are evergreen forms of azaleas, however. Flower colors range from white, through the pinks, roses, lavenders, purples, and reds. Healthy plants are covered by blooms in the spring—some completely hiding their leaves with flowers.

Among the many types, two azaleas are distinct: Kurumes and Indicas. The Indicas (or Indians) azaleas are larger-growing and produce larger flowers. Kurumes, sometimes called dwarf azaleas, make up in number of flowers what they lack in size. Both are evergreen in the lower and middle South. Kurume azaleas are low and compact in growth, making them ideal for use in foundation plannings of low modern homes. Some are upright, making a rather large, open-branched plant. They are used for ornamental plannings as far north as New Jersey.

Many deciduous azaleas, dropping their leaves in winter, are found in adapted areas throughout the United States. In colder climates, most azaleas need winter protection of hay,

Henry J. Smith, a Florida native, is Assistant Horticulturist in Charge of Landscaping with the Mississippi Agricultural Extension Service. He earned his MSA in horticulture from the University of Florida. Author of several articles on ornamentals, he now serves as instructor for the Garden Clubs of America, Inc.

straw, or brush. The Kaempferi hybrids are considered the hardiest sorts. They will live through the winter as far north as Boston.

Deciduous azaleas can be propagated by seed. Indicas and Kurumes are propagated commercially by cuttings. Many home growers layer plants as well as root cuttings. I know several gardeners who have large banks of azaleas in the yard—all plants layered from a single specimen. Of course, this requires several years' time.

Most of the popular varieties root quickly from soft-wood or semi-hardwood tip cuttings. These should be placed in a mixture of equal parts of peat and sand. Cuttings may be made at any time of year, but June growth has proved to be especially good. Make cuttings about 6" long, do not allow to wilt. Remove lower leaves, leaving 4 or 5 at upper tip. Make a slanting, smooth cut across the base end. Plunge cuttings in soil mixture up to leaves. Cuttings must be kept in a moist place for roots to form. A deep wooden box, covered in glass or burlap makes a good rooting bed. A shaded cold frame makes a good rooting area. Allow for movement of air which is just as important as moisture.

Cuttings should produce roots in about six weeks. They may be left in the frame until spring, then planted in prepared soil. Organic matter, such as peat or the top two inches of decayed leaves from beneath oak trees, should be worked into the soil along with well-decayed cow manure. Keep young plants well watered and mulched with oak leaves, pine straw, peat, or sawdust.

The ideal soil for rooted cuttings and ball-and-burlap plants from the nursery should be quite acid. Like camellias, they will not tolerate alkaline soil. This should be kept in mind when using plants in foundation plantings at a new home. Often the soil will contain fragments of mortar, lime,

DIGGING THE HOLE

When planting an azalea, dig a hole somewhat larger than the rootsystem. Build up the hole with rich organic materials as peat moss and decayed oak leaves.

or stone alkaline in reaction.

The south wall of a house may be too hot for azaleas and camellias during the summer. Often, they do much better on the east or north. An especially good spot for them is beneath large deep-rooted trees. An elm has roots too near the surface competing with the shallow roots of camellias and azaleas. Beneath pine trees is a favorite spot for these plants. Here they can receive filtered light, with usually a better moisture supply than in open areas. Although they like moisture, they will not thrive in too damp a place of poor drainage.

Soil, which should be fairly sandy in nature, must contain a large amount of organic matter. A small amount of clay is desirable. If your yard is entirely of sand, work clay into the spot where azaleas and/or camellias will be planted. If it is too heavy in clay, work sand into the soil. Generous amounts of acid peat, decayed leaves, or compost should be turned in along with well-decayed cow manure.

When individual plants are used, they should be placed in holes larger than the ball and burlap, then fortified with the above materials. Break up the sub-soil to a great depth to prevent water standing around the roots during rainy seasons. The ideal soil will be pH 4.5 to 5.5. *It's wise to test your soil with a kit or ask your county agent for this service.*

Any alkalinity in the soil is almost like a poison to azaleas. Aluminum sulphate will often correct alkaline conditions. Sulphur is very good to change soil to an acid reaction, although it is slower than aluminum sulphate (alum). It is important to set ball and burlap plants at the same level they were growing in the nursery. Many growers set them about an inch higher, to allow for settling of ball. Because of their shallow roots, plants will die if placed too deeply in the ground. If soil around the roots has dried out, soak the ball in a tub of water before planting. Apply plenty of water at the time plants are set, in order to drive out any air pockets.

Plants require perfect drainage through the soil. Yet there must be sufficient moisture to prevent wilting during summer months. Often, azaleas making few or poor flowers in the spring can be traced back to little moisture in August and September of the year before.

A good mulch is almost necessary for azaleas and camellias. It warms the soil in the winter, cools it in the

SETTING THE PLANT

Set plant at same level at which it was growing in the nursery. Some growers prefer to set plant slightly higher to allow for settling of ball. Azaleas are very shallow rooted and must not be set too deeply.

summer. Since these plants are shallow-rooted, they should not be cultivated except by hand. A hoe may damage roots. A good mulch helps to control weeds, while holding moisture in soil around the plants.

Such materials as pine straw, peat moss, half-rotted sawdust, decaying leaves, cotton or peanut hulls make a good mulch. As the mulch rots down, apply more to keep the mulch about 3" deep over the roots.

Many soils improved by organic matter will grow good azaleas. However, most soils require diet supplements in the form of fertilizer. Yellowish foliage is typical of plants which lack proper nutrients. Iron deficiency or chlorosis is rather common. Best results are obtained when a balanced azalea and camellia fertilizer formula is used. These are sold as "Azalea and Camellia Mixtures," which contain all necessary elements for ideal growth. They contain acid-forming materials. Commercial fertilizers usually are best if applied in liquid form. Keep plants well watered for some time afterwards.

Dr. H. H. Hume, noted camellia and azalea authority, recommends the following formula:

10 pounds ammonium sulphate
35 pounds superphosphate
17 pounds sulphate of potash
28 pounds cotton seed meal
10 pounds aluminum sulphate

100 pounds

This acid-reaction mixture may be used at the rate of two pounds per 100 square feet. It is satisfactory to mix with peat or sawdust in making a mulch. Use about ¼ pound per bushel of mulch.

Commercial fertilizer should be applied after plants have flowered in the spring. A second application should be made in a month or six weeks. About three pounds per 100 square feet of azalea bed, or ½ to 2 pounds per specimen plant should be used. Do not scratch fertilizer into soil, because of shallow roots on azaleas.

Organic fertilizers are very desirable for azaleas. They are usually applied in mid-winter. Never apply organics to azaleas during the growing season. One excellent organic mixture is:

1 bushel peat humus
5 pounds cotton seed meal
1 pound sulphate of ammonia
4 ounces ferrous sulphate

This mixture should be applied as a mulch around the plants during

FILLING IN TOPSOIL

Fill in around the ball with topsoil and peat. Always apply water as soil is firmed around the ball. This drives out air pockets, causing good contact between roots and soil.

December or January. Use about one gallon of dry mixture for each foot in width or height of plant, whichever is greater.

Red spider is a serious pest that attacks the foliage and sucks the juices from plants. Loss of healthy green color in the foliage and premature dropping of foliage indicates red spiders. Spraying the foliage with the garden hose will control them. Do it late in the afternoon for two or three weeks. Even better, dust plants with sulphur twice a week for four or five applications. Other good chemical controls are on the market.

The azalea lace bug is an important pest of the plant. It attacks the foliage by sucking the juices. Brown or black spots on the underside of leaves and ashen color of leaves detect it. These spots are excretement from the insect. Pyrethrum compounds, Rotenone dust or sprays, and Black-leaf-40 in a soap solution will control the azalea lace bug. This insect usually appears during the months of May, June, and July.

Tip-blight or dieback of azalea is a true parasitic disease. The disease appears as light brown blotches on the leaves. They are irregular, sometimes almost circular, in form. The disease usually starts at the tip of the leaf and moves back over the entire surface. Infection may move down into the branch. A stem canker may form. This can girdle and eventually kill the entire branch.

Blight infection may begin at any time during the growing season, especially during wet periods of summer. Once branch cankers are present, they may grow and spread all season. Plants showing this blight should be pruned to remove all diseased branches. Cut well below any brown discoloration on the inside of the stems. If the infection is serious—that is, covering all parts of the plant and especially the larger branches—the entire plant must be destroyed. It can infect other plants. Infected plants should be sprayed with standard bordeaux mixture, especially just after blooms fade.

Azalea leaf gall is a fungous disease enlarging the leaves. The surface of the gall is coated in white, representing the spores of the fungus. Beneath this white coating is a purplish discoloration. If the infection is light, hand pick the leaves and burn them. This should be done before spores mature and spread. If spores are allowed to ripen, wind and insects will spread them to the foliage of other plants where they will grow the fol-

Azaleas may be propagated by "layering." By this method, low branches are pulled to the ground, covered in soil, and pinned down by a weight. When roots form, new plant is cut away from "mother" plant.

PROPAGATING THE AZALEA

lowing season. For heavy infection of azalea leaf gall, spray plants with bordeaux at weekly intervals from April through May. There are several other copper compounds on the market which give good control.

Flower spot or petal blight is one of the worst diseases of azaleas. It appears as tiny spots, brown on white flowers, or white on colored flowers.

When moisture is present, these spots enlarge and soften. With continued moist weather, the flowers soften and hang from the plant in "limp blight." The carry-over stage appears on the dried-up flowers. The disease can be greatly reduced if old flowers and the mulch beneath plants are removed and burned. Spraying with dithane should be started just as soon as flowers open. Continue almost daily through the flowering period. Some growers use the following mixture, sprayed three times a week: 1 gallon of water, 2½ teaspoons liquid dithane, 1 teaspoon zinc sulfate and lime.

Stunted and undersized leaves, with brown leaf tips, show that rhizoctomia rot is at work. The brownish discoloration can spread until the entire plant turns brown and dies. Control rhizoctomia rot by spraying with a low-lime bordeaux mixture of fermate.

Cold injury of azaleas may not be evident until several weeks or months after the freeze. Cold injury causes wilting of foliage, followed by a blackening or browning of leaves with eventual death of the injured parts. The bark of twigs and branches of azaleas injured by cold will often split. Completely girdled branches should be pruned from the plant. When sections of bark are not killed, they may heal over and the plant recover. The only protection against cold damage is to harden-off plants before they enter the winter season.

Those plants which are in rapid growth will be damaged most by cold. When severe freezes are forecast, mound leaves or other material around the base of the plants. Usually, lower shrub stems suffer most from cold damage. If a plant is killed by split bark, it will not grow back from the roots.

Azaleas make excellent landscape subjects throughout the year. The evergreen varieties are most attractive in winter months, and deciduous forms have interesting branch and twig arrangements.

Azaleas are ideal as low-growing shrubs to "face down" camellias, their form somewhat rounding and complimenting either side of the upright camellia.

They are also ideal in front of larger shrubs. They make very good specimens for mass plantings. Some varieties have formal upright growth often needed in foundation plantings.◄◄◄

APPLYING THE FINDINGS

At the present time recommendations for the application of boron to apple trees are based upon the occurrence of visual symptoms of boron deficiency. When such symptoms occur, growers are advised to apply borax at the rate of ¾ pound per mature bearing tree every third year.

This application has been effective in correcting the visual symptoms of boron deficiency. In a few instances where chemical data have been made available and where the foliage content of median shoot leaves in late July was 20 ppm boron or less, a similar recommendation was made even though no visual symptoms were in evidence.

No doubt the practice of basing recommendations for boron application upon the occurrence of visual boron deficiency symptoms will continue until such time that diagnosis can be based on chemical analysis of the foliage. It should be recognized, however, that at some point before visual symptoms occur boron deficiency may have already caused a reduction in growth and yield. Research Bulletin 754, Ohio Agricultural Experiment Station, Wooster, Ohio.

YOUR LAWN

DOES IT LOOK A LITTLE SICK?

IF SO,
HERE'S A USEFUL PRESCRIPTION

If your lawn looks a little sick, here's a prescription for greener grass: lime, fertilize, roll, reseed, and control weeds.

That's the advice of lawn experts from the University of Maryland.

The principal causes of ailing lawns are poor soils, poor quality seed, too little lime and fertilizer, and too much trampling.

Home owners frequently add to these troubles by too much of the wrong kind of care, namely, cutting the grass too often or giving the lawn frequent light sprinklings of water in dry seasons. These help the weeds more than the grass.

Right now, early in the season, is a good time to remedy some of these troubles.

First on the agenda is building up the soil. Soil tests are the best guide to lime and fertilizer requirements, but since most lawns are deficient, maintenance applications are usually a safe bet. Fifty pounds of ground limestone, or its equivalent, applied per 1,000 square feet every four or five years will keep up good lawns. More is needed if soil is very acid. Between 10 and 20 pounds of 10-10-10 fertilizer per 1,000 square feet, applied evenly in March or April will stimulate growth.

Rolling will help to smooth out rough spots. Roll when the soil is slightly moist, and when the ground is not likely to be frozen again.

Reseeding bare spots is usually best done in the early fall, but spring seeding will work, too. For uniform lawns, it's probably best to reseed with the same kind of grass seed originally planted. Kentucky bluegrass is a favorite, but it must be seeded before April 1. For later seeding, try ryegrass.

Many common lawn weeds can be controlled with 2,4-D, but be careful around ornamental plants.

X-RAYING SOILS

AT ILLINOIS

TO JUDGE ITS MANY ABILITIES

Soil scientists at the University of Illinois are now using X-ray equipment to identify the different minerals and chemical elements in soils. A. H. Beavers reports that Illinois is one of the first soil laboratories to do this.

Beavers points out that about 95 per cent of the soil is made of minerals of different sizes. With the help of X-ray equipment, the tiny clay mineral portions can be identified. Without X-rays this would be almost impossible.

With X-rays, the scientists can identify practically all the different chemical elements in a soil sample in about 45 minutes. The old laboratory method of total chemical analysis takes so long that the cost makes it prohibitive.

Major use of this new equipment will be in soil surveys, soil mapping, and in special soil research projects. One project now nearing completion is a study of Northeast Illinois soils.

Another project is a study of the minerals and elements of loess, a fine material from which about 70 per cent of Illinois soils have developed. With the use of the X-rays, Beavers is studying the changes in loess as soils develop from it.

When the kinds of minerals in a soil are known, it is possible to judge the water-holding capacity and the ability of the soil to grow different crops. From the findings of this research, landowners and farmers are able to know more about their soils and how to use them for best results.

For Reliable Soil Testing Apparatus there is no substitute for LaMOTTE

LaMotte Soil Testing Service is the direct result of 30 years of extensive cooperative research. As a result, all LaMotte methods are approved procedures, field tested and checked for accuracy in actual plant studies. These methods are flexible and are capable of application to all types of soil, with proper interpretation to compensate for any special local soil conditions.

Time-Proven LaMotte Soil Testing Apparatus is available in single units or in combination sets for the following tests:

Ammonia Nitrogen	Iron
Nitrate Nitrogen	pH (acidity and alkalinity)
Nitrite Nitrogen	
Available Potash	Manganese
Available Phosphorus	Magnesium
Chlorides	Aluminum
Sulfates	Replaceable Calcium

Tests for Organic Matter and Nutrient Solutions (hydroculture) furnished only as separate units.

LaMotte Combination Soil Testing Outfit

Standard model for pH, Nitrate, Phosphorus and Potash. Complete with instructions.

Illustrated literature will be sent upon request without obligation.

LaMotte Chemical Products Co.

Dept. BC Chestertown, Md.

"DARK GREEN AND FAT"

Some Pointers toward . . .

By George D. Scarseth
Director of Research

WE have our score card for show cattle and bathing beauties, but nobody has made a point of what the farmer should look for when sizing up how well his corn crop is doing. What is "The Corn Look" for profit?

The corn breeder has new styles in the making, but until these are ready it may be useful to have a guide to go by.

"Dark green and fat" expresses the impression one gets of a corn plant that is headed for a top yield.

A good time to evaluate a corn plant is from silking to full ripeness. Here are some points to look for:—

- **The diameter of the stalk must be large with heavy nodes. Important factors for this are abundant available phosphorus and nitrogen. Too thick a stand will cause stalks to be slender and weak, especially if the phosphorus supply is limiting, yet the stand must be enough for the top yield. In the corn belt, for the majority of farms, this is a population of about 18,000 stalks per acre. A well-fed, thick stand shades the ground and helps hold moisture and a check on grasses, while a thin stand lets in too much light for the grasses and heat for the soil.**

- **The leaves must be wide and shiny with a waxy luster that shows a uniform dark green color. Any yellowing of the lower leaves along the midrib from the leaf tip as a result of nitrogen shortage or along the outer margins showing a potassium starvation is a sign of money being lost. Any other departure in leaf color from the ideal is a sign of trouble, and probably can be cured for extra profits through diagnosis and treatment—soil**

"NEVER SO WELL EQUIPPED"

Addressing the American Bankers Association in Chicago, True D. Morse, Undersecretary of Agriculture, declared: "Banks were never so well equipped to work with farmers in the management of their farms and family finances. There are over 600 farm specialists on the staffs of banks, with an estimated 1,000 or more agricultural men employed by banks."

Pointing out that "leadership and sound guidance by those providing credit will often be more important to farm families than the money loaned," the USDA official told the bankers "money loaned under wise and careful supervision . . . puts farmer, and banker or lender, in a partnership that can hardly be kept from making real progress."

Countryside Marketing

---

and plant tissue tests and fertilization. Sometimes this fertilization involves more than merely nitrogen, phosphorus and potassium. Be on the alert for the hunger signs as well as diseases and insects.

. . . A Score Card For Corn

American Farm Research Association
Lafayette, Indiana

• **The brace roots must be big and lusty—almost like big night crawlers reaching into the ground. Brace roots are never like that on soils starved for phosphorus. The key to a good plant performance is big brace roots. If they are not big and strong, start looking for the trouble. It is likely a deficiency of phosphorus.**

• **When the corn is ripening, the whole plant, including the outside husk on the ear should remain green. When the ear ripens with a white outside husk something is wrong, usually a lack of nutrients, especially nitrogen. Dry weather will cause a white outside husk too, but that is because the roots can't take up enough nitrogen out of the dry soil. The deepest kernels and heaviest ear is made when the ripening process turns only the inside husks white, and the outside husk remains green until the kernels start to dent. Any corn that shuts down the corn-making-factory too early in the season for lack of water, nutrients or too hot weather, is robbing the farmer. Such corn kernels tend to be short, flinty and the ear small in diameter. The higher the nitrogen supply at ripening time, the higher will be the protein content. Protein content is reflected in the width of the endosperm—the amber colored hard part of the seed as seen when a kernel is split. The lower the protein content the wider is the starchy part of the seed.**

There are more characteristics to look for, but the four listed here cover a lot of factors which spell good or poor corn performance. As my old Professor Truog of Wisconsin used to say—"It's simple if you understand it."

"AS A MODERN BUSINESSMAN"

Farming has changed greatly in the past generation. No longer is the farmer the isolated and independent individual of the past, living from products of his own land and labor. Today he enjoys all the conveniences of modern science—electricity, running water, radio, television and the automobile. Likewise, the successful modern farmer is a businessman with a vast amount of "know how." He keeps up with the technical developments in fertilizers, insecticides, fungicides and herbicides; with new crop varieties; with new breeding and feeding techniques; with new farm equipment, and so on. If he is to produce efficiently he must have modern labor-saving machinery, adequate credit, and above all,—a productive soil on which to use his modern equipment and "know how."

Kentucky Bankers Association

AGRICULTURE, THE GR

Modern agricultural industry continues to call for more and more agricultural graduates—in some areas, twice as many as our land grant institutions graduate each year.

In a report on this picture of supply and demand, the National Association of Land Grant Colleges and Universities revealed. . .

- That the farm equipment industry can use 2,000 additional men a year for the next few years.
- That the farm building industry can use 1,500 graduates a year for the next few years, and the water and irrigation engineering industry about 250 men a year during the same period.
- That although agricultural colleges graduate less than 200 dairy manufacturing majors each year, this industry estimates it can place 1,000 such graduates annually for the next 5 or more years.
- That 15 agricultural chemical companies, large and small, now employ about 375 agricultural college graduates and plan to add 175 more during the next 5 years.
- That the fertilizer industry estimates a continuing need of 200 to 300 college graduates a year for the next 10 years.
- That enterprises serving the poultry industry have 20 jobs awaiting every qualified applicant—using from 2,500 to 3,500 graduates in the next 5 years.
- That the soybean industry through rapid expansion, estimates it will need at least 1,000 more agricultural graduates over the next 5 years.

Does it pay to get a college education in preparing for a career in agricultural industry? The answer to that, perhaps, was given by a recent Kiplinger News Letter issued out of Washington.

Kiplinger reported the average high school graduate earns $165,000 in a lifetime—and that the average college graduate earns $268,000 in a lifetime. The difference: $103,000. It does pay, apparently, to get a college education in preparing for a career in agricultural industry.

Its Industry—A Ve

And when he completes his studies at any one of the nation's 51 great land-grant institutions, the agricultural graduate faces an industry which can justly be called "a versatile giant." For it is gigantic—

GREAT ADVENTURE–II

These are just a few examples of the opportunities awaiting the farm youth of the nation in agricultural industry—a vast, complicated system on which farmers depend for most of their supplies, their equipment, and their facilities.

Typical jobs in agricultural industry, according to the National Association report, include careers. . .

• *In processing.* Industry turns the raw food and fiber into groceries and clothing for the American home. Processors employ nearly as many people as farms do in planting, cultivating, and growing the original crops.

• *In field tests and demonstrations.* Even the best engineered farm equipment must be tested and demonstrated by agriculturally trained men —who know what a forage harvester must do, for example.

• *In management.* According to those who have been along the road, men who direct or manage agricultural industries must know agriculture. Most of them work their way to the top from an agricultural education.

• *In research, design, and engineering.* Putting an idea on paper, using it to solve farm and industrial problems requires creative thought, abilities, and skills. College training develops such talent.

• *In sales, promotion, and advertising.* Selling is not only knowing the product and what it does—but also knowing the customer, his language, and his desires. Such men often address farm meetings, so they must know agriculture.

-A Versatile Giant

and quite versatile. It consists of 12 major areas . . .

- Machinery, Equipment, and Supplies.
- Food processing.
- Grain and seed processing.
- Meat and poultry packing.
- Fertilizer and lime.
- Pesticides and herbicides.
- Feed manufacturing.
- Dairy processing.
- Fats and oils.
- Textiles and fibers.
- Buildings and utilities.
- Lumber and forest products.

Building Tomato Yields

By E. Reeve, R. M. Mroch, R. W. Backes, R. D. Peel
Campbell Soup Company West Chicago Illinois

IT has long been recognized that a systematic crop rotation program helps to increase soil productivity and is conducive to a prosperous agriculture.

Some of the benefits normally derived from a well-planned crop rotation system are: (1) protection against complete crop loss in any one year, (2) reduced disease, insect, and weed hazards, (3) more efficient use of lime and fertilizer, and (4) distribution of farm labor load.

There are perhaps many good rotations that can be followed. The choice should be based on local soil, climate, and market conditions. Reports of specific rotation experiments, including deep-rooted legumes with vegetable crops, are limited. The purpose of this article is to present a progress report of such a study.

Outline of Study

In 1950, an experiment was initiated to study the influence of different crop rotations, Table I, and fertilizer treatments, Table II, on several of the more important vegetable crops grown in southern Cook County, Illinois. The experiment was located on a flat lake bed soil, tentatively classified as Pella clay loam. It was reported locally that the specific field used for the study had been cropped with onion sets

for over 60 years continuously.

Such a cropping history is somewhat typical of the area. Eight rotations were included in the study. Each rotation was replicated four times in 14′ x 100′ randomized plots. Half of each plot was fertilized yearly according to the crop requirement and laboratory soil test values, while the other half received no fertilizer throughout the rotation cycle. Fertilizers containing minor elements were used to eliminate the possibility of minor element deficiencies.

To facilitate both internal and surface drainage, the normal practice in the area has been to plow and cultivate the soil in ridges or beds 14-feet wide. The same system of ridging was followed in this study. Enough space was provided around each plot to permit use of conventional farm equipment. The general plot layout is shown in Figure 1. All plowing was done in the fall, and all fertilizer applications were applied broadcast and disked in just prior to planting in the spring.

The carrots, onion sets, sugar beets, and tomatoes were harvested according to standard commercial practice. The normal marketable portions of the respective crops were removed, and the usual plant residues were left on the plots and plowed under. The alfalfa in rotation 7 was not harvested in 1952 but was cut twice in 1953 and removed from the plots. None of the sweet clover in rotations 6 and 8 or the red clover in rotation 4 was harvested and removed.

In an attempt to determine what influence the rotations may have had on certain physical properties of the soil, undisturbed soil core samples were taken in duplicate from each plot at the completion of the tomato harvest and prior to plowing in the fall of 1954. The core samples represented a profile layer extending from two to six inches below the soil surface. Bulk density, total and aeration porosity measurements were made on each sample in the laboratory. Composite samples representing the Ap horizon were also taken for aggregate analysis.

The standard spray schedules for carrots, onion sets, and tomatoes were followed for the respective crops throughout the rotation cycle. Diseases and insects presented no unusual problems, and no differences were noted at any time between rotations.

Through Deep-rooted Legumes and Fertilizer Treatment

Deep-rooted Legumes Double Tomato Yields

Tomatoes appeared in all 8 rotations at the beginning of the experiment in 1950 and again in 1954. Tomato yields from all plots in 1950 were essentially the same (17.84 tons per acre) which indicated the soil in the experimental

Table I—Crop Rotations

Rotation Number	1950	1951	1952	1953	1954
1	Tomatoes	Onion Sets	Onion Sets	Onion Sets	Tomatoes
2	Tomatoes	Onion Sets	Tomatoes	Onion Sets	Tomatoes
3	Tomatoes	Tomatoes	Tomatoes	Tomatoes	Tomatoes
4	Tomatoes	Onion Sets	Carrots	Red Clover	Tomatoes
5	Tomatoes	Carrots	Onion Sets	Sugar Beets	Tomatoes
6	Tomatoes	Onion Sets	Onion Sets	Sweet Clover	Tomatoes
7	Tomatoes	Onion Sets	Alfalfa	Alfalfa	Tomatoes
8	Tomatoes	Onion Sets	Sweet Clover	Sweet Clover	Tomatoes

area was uniform. The 1954 yields as shown in Figure 2 reflect the influence of the different rotations on tomato yields. On the basis of 1954 tomato yields, the rotations fall into three general groups.

Group 1 (rotations 1, 2, and 3), consisting of different arrangements of tomatoes and onion sets in the rotation, gave the lowest tomato yields.

Group 2 (rotations 4 and 5) which included in addition to tomatoes and onion sets, carrots and

Figure 1. View of Crop Rotation Field Plot. (Photo Courtesy of H. L. Garrard)

Table II—Five-year Fertilizer Record

Rotation Number	Total plant nutrients applied to each rotation, lbs./A		
	N	P_2O_5	K_2O
1	167	668	668
2	212	584	584
3	302	416	416
4	104	416	416
5	126	500	500
6	125	500	500
7	83	332	332
8	83	332	332

sugar beets or carrots and red clover, produced substantially higher yields than resulted from rotations containing only tomatoes and onion sets.

Group 3 (rotations 6, 7, and 8), containing in addition to tomatoes and onion sets, a deep-rooted legume—either alfalfa or sweet clover—produced tomato yields substantially higher than were produced by any of the other rotations tested. The highest yield was obtained from rotation 8 (tomatoes, onion sets, sweet clover, sweet clover, tomatoes).

The 1954 tomato yield from the fertilized half of the rotation plots was significantly higher than that from the unfertilized half, Figure 3.

Fertility Levels Were Maintained

Phosphorus: Results of laboratory determinations for available soil phosphorus are shown in Figure 4. The available phosphorus level of the soil was high at the beginning of the experiment, and although the level decreased in all rotations on the unfertilized portions of the plots, it was still high after five years. The fertilizer applications on rotations 3, 4, 6, 7, and 8 maintained the phosphorus level essentially unchanged while the level was increased on rotations 1, 2, and 5. There was a marked difference in the available phosphorus content of the soil at the end of the five-year period between the fertilized and unfertilized plots.

Potassium: As with phosphorus, the available potassium level of the soil was high at the beginning of the experiment, Figure 5. The fertilizer applications on all rotations were adequate to maintain or increase the available soil potassium content on the respective rotations. The mean potassium level of the unfertilized plots dropped to a sig-

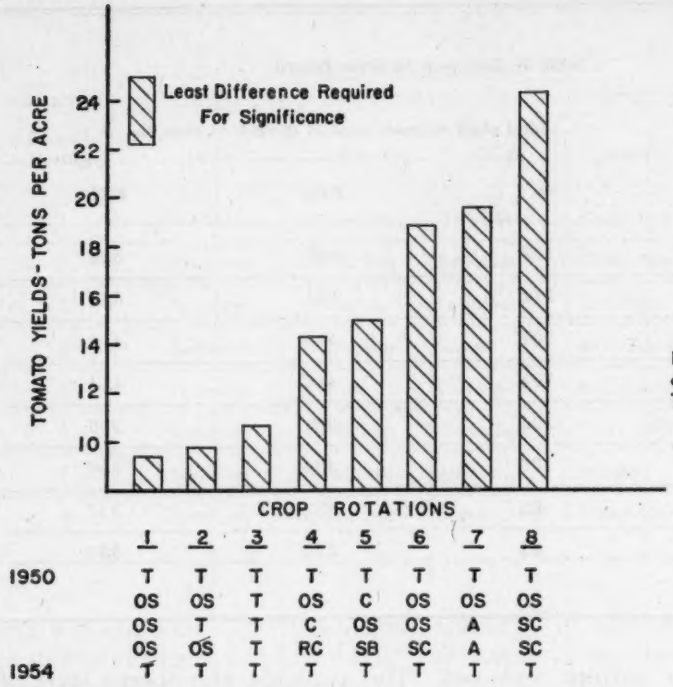

TOMATO YIELDS - TONS PER ACRE
Least Difference Required For Significance
24
22
20
18
16
14
12
10
CROP ROTATIONS
1 2 3 4 5 6 7 8
1950 T T T T T T T T
OS OS T OS C OS OS OS
OS T T C OS OS A SC
OS OS T RC SB SC A SC
1954 T T T T T T T T
A-ALFALFA C-CARROTS RC-RED CLOVER OS-ONION SETS
SB-SUGAR BEETS SC-SWEET CLOVER T-TOMATOES

Figure 2. Influence of Crop Rotations on Tomato Yields.

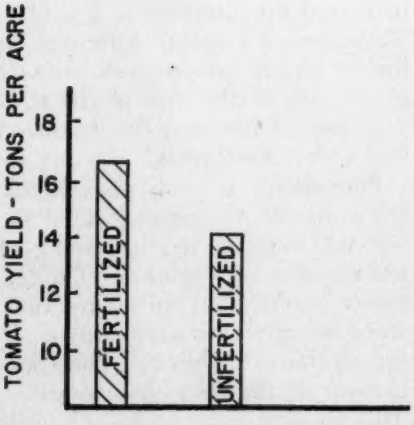


Figure 3. Influence of Fertilizer Treatment on Tomato Yield.

nificantly lower level than that of the fertilized plots.

pH and Organic Matter: pH and organic matter soil test values were not appreciably changed during the five-year period by the rotation and fertilizer treatments. The mean pH value for all plots prior to treatment in 1950 was 6.5 as compared to 6.4 after the 1954 tomato crop. The respective organic matter soil test values were 5.0 and 4.8 per cent.

Change in Soil Physical Properties Not Detected in Laboratory

Results of laboratory measurements of bulk density, aeration and total porosity, and aggregate size

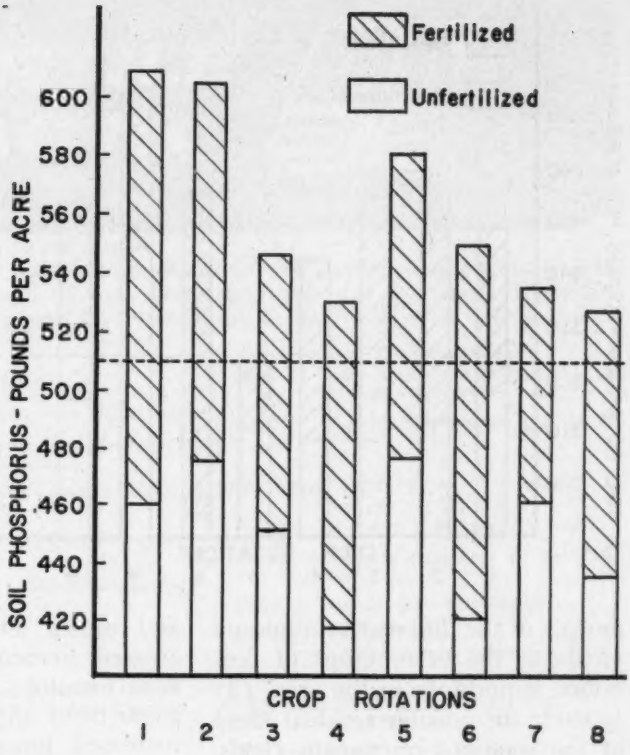


Figure 4. Summary of 1954 laboratory soil test data for available phosphorus. Dotted line indicates mean phosphorus level at initiation of study.

and stability indicated no statistically significant difference between rotations or fertilizer treatments.

Discussion

Frequently the beneficial effects from alfalfa and sweet clover in crop rotations are ascribed to an increased nitrogen supply as a result of symbiotic nitrogen fixation. It is doubtful, however, the increased tomato yields obtained from rotations with deep-rooted legumes in this study resulted primarily from nitrogen supplied by the legumes.

This interpretation is perhaps valid since (1) additional fertilizer nitrogen was applied to the non-legume rotations, Table II, to compensate for nitrogen contributed by the legume rotations, and (2) tomatoes in replicated experiments on the same soil type adjacent to the rotation plots have failed to respond to supplemental nitrogen applications.

Since differences in soil physical properties were not detected by laboratory measurements, a precise explanation for the beneficial effects of the deep-rooted legumes is not possible at present. It is assumed, however, the benefits on this particular soil were largely of a physical nature.

The rotations are being continued in order (1) to determine the in-

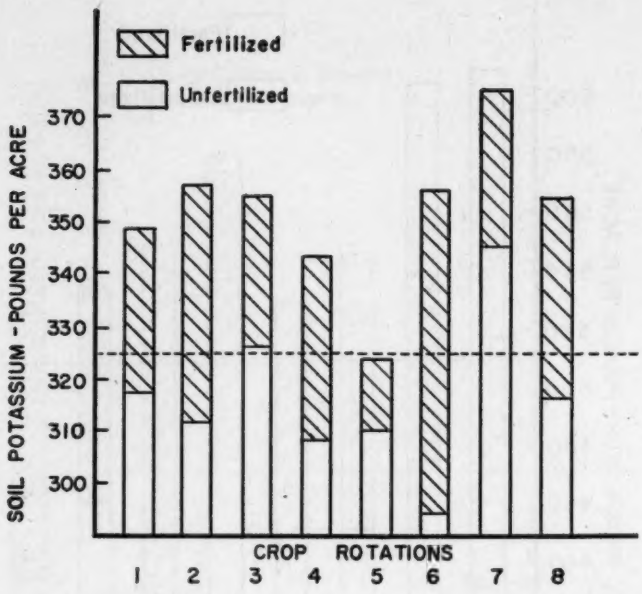


Figure 5. Summary of 1954 laboratory soil test data for available potassium. Dotted line indicates mean potassium level at initiation of study.

fluence of the different rotations on yields of the other crops of economic importance in the area, (2) to study the possible residual effect of the rotations on tomato yields, and (3) to explore in greater detail a possible explanation for the pronounced influence of deep-rooted legumes.

Summary

Tomato yields were essentially doubled by two years of deep-rooted legumes (alfalfa and sweet clover) in a four-year rotation, as compared with rotations involving only tomatoes and onion sets or continuous tomatoes.

Likewise, one year of sweet clover in a rotation with tomatoes and onion sets substantially increased tomato yields. Rotations with tomatoes, onion sets, carrots, sugar beets and/or red clover also increased tomato yields, but the increases were not of the same magnitude as those from rotations with deep-rooted legumes.

Tomato yields were increased by fertilizer treatment. In general, the fertilizer treatments used on all rotations were adequate to maintain or increase the fertility level of the soil.

Any influence the different rotations may have had on the physical properties of the soil was not reflected in laboratory measurements of bulk density, total and aeration porosity, or aggregate size and stability. ◄◄◄

SO RECEPTIVE

At no time in the history of agriculture has the agricultural mind been so receptive to scientific teaching, provided it can be grafted on to the business of farming. (Editorial in The Farmer's Weekly).

The following article reprints on profitable soil and crop management are available on request. Please indicate the reprint code and the number you desire. The address is: American Potash Institute, 1102 16th Street, N. W., Washington 6, D. C.

SOIL AND PLANT ANALYSIS

I-4-56 Surveying Corn Fields by Tissue Tests

L-5-56 Give Your Plants a Blood Test—Guide to Quick Tissue Tests

O-6-56 Plant Analysis As a Guide to Fertilization of Crops

Y-12-56 Leaf Analysis, A Potential Forestry Tool

E-2-57 Soil Testing Via County Laboratories

FORAGE CROPS

FF-8-54 Apply Fertilizers in Fall for Old Alfalfa, Grass Pasture and Timothy-Brome Fields

MM-10-54 Longer Life for Ladino

S-4-55 Greener Pastures Mean Better Living

Y-5-55 Pasture Improvement Through Renovation

A-1-56 Why More Alfalfa?

X-12-56 Fertilizing Alfalfa in Kentucky

GENERAL FIELD CROPS

G-2-55 Seven Steps to Good Cotton

L-3-55 Soybean Production in the Southern States

U-4-55 Fertilizer Recommendations—Burley Tobacco

W-5-55 The Production of Sugar Beets on Organic Soils

C-1-56 A Successful Corn Crop on the Same Land Every Year Is a Possibility

M-5-56 The Placement of Fertilizer for Peanuts

N-5-56 Fertilizer Placement for Corn in Minnesota

VEGETABLE CROPS

SS-12-49 Fertilizing Vegetable Crops

SS-11-54 Foliar Application of Plant Nutrients to Vegetable Crops

V-4-55 Planned Nutrition for Canning Tomatoes

FRUIT AND NUT CROPS

P-3-55 N-P-K for Deciduous Fruit Trees

X-5-55 What Is Happening to Our Citrus Soils?

EE-10-55 Fertilizing for Better Apples

B-1-56 Certain Practices Are Important for Successful Pecan Production

SOILS AND FERTILIZER—GENERAL

HH-10-55 Fertilizers Will Cut Production Costs

G-2-56 Plant-Food Content of Crops—Guide to Rotation Fertilization

H-3-56 The Application of Fertilizers in Irrigation Waters

U-10-56 Fertilizer and the Florida Farmer

V-11-56 Potassium—The Alkali of Life

C-2-57 Potash Fertilizers & Their Behavior

D-2-57 Fertilizing Pangolagrass and White Clover

F-3-57 Sound Fertilizing Equals Economical Crop Production

H-3-57 Lime . . . Its Placement & Penetration in Soils

GENERAL

Z-5-55 Azalea Fertilization

K-4-56 The Value of Green Manure Crops in Farm Practice

T-10-56 Withdrawals from the Soil Bank—Pacific Northwest Crops

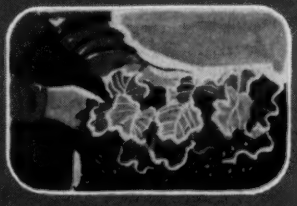
A-1-57 Long-Range Outlook for Agriculture . . . GOOD!

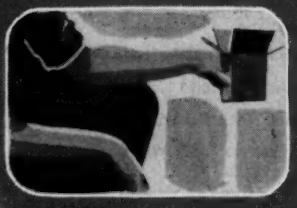
B-1-57 High Yields—Fruit of Wise Land Management

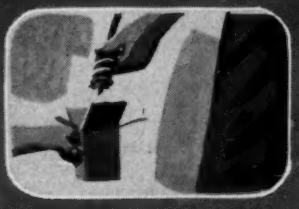
G-3-57 A System for Recording Soil Fertility Data

API

Free
EDUCATIONAL FILMS







SCHEDULED ON REQUEST

Film Loan Service

The following picture services are available for loan from the American Potash Institute in Washington. Please write well in advance of the date the film is needed—giving your group's name, date of exhibition, and period of loan.

FILMS—16MM

POTASH PRODUCTION IN AMERICA (25 min.)

Featuring location, formation of American potash deposits . . . Mining and refining potash in California and New Mexico.

SAVE THAT SOIL (25 min.)

Depicting early South, showing results of one-crop-system . . . reclamation and conservation of southern soils through legumes . . . and modern soil management.

THE PLANT SPEAKS (Series of 4 films)

Through Deficiency Symptoms—showing soil depletion, erosion, results of plant food losses . . . deficiency symptoms in field and orchard crops. (25 min.)

Through Soil Tests—showing where, how to take soil samples, on the farm . . . value of soil tests when interpreted by experienced soil chemists. (10 min.)

Through Tissue Tests—showing value of tissue testing . . . procedure for testing corn tissues in field with Purdue field test kit. (14 min.)

Through Leaf Analysis—showing use of leaf analysis in determining the fertilizer crops need . . . how leaves are sampled and analyzed. (18 min.)

BORAX FROM DESERT TO FARM (25 min.)

California desert scenes where borax is produced . . . showing importance of borax in agriculture . . . with boron deficiency symptoms in olives, celery, cauliflower, crimson clover, alfalfa, sweet potatoes, table beets, radishes, apples.

IN THE CLOVER (22 min.)

Showing value, uses, culture, fertilizer requirements of ladino clover in North American agriculture.

SLIDE SETS

For Sale. For loan: ten days. Scripts included with sets. Available as film strips, also.

SUCCESSFUL ALFALFA

Featuring steps necessary to grow alfalfa successfully . . . and profitably. ($6.00)

SOIL FERTILITY & SOYBEANS

New concepts of producing soybeans, covering all phases of production. ($6.00)

POTASSIUM HUNGER SIGNS

Deficiency symptoms on our major crops and effects of potassium hunger. ($3.00)

POTASH PRODUCTION

Vivid slides on mining and refining processes used by the potash industry. ($6.00)

The Editors Talk

OF TREES AND PROFITS

Tree farming—or growing timber as a crop—is profitable. It is also a big factor in the economy of our nation, according to a report across our desk from the American Forest Products Industries.

In the United States today are some 4,461,274 "small" woodlot owners whose holdings average under 500 acres. They hold 61 per cent of the nation's commercial forest land and each year sell $700 million worth of sawlogs, pulpwood, posts, turpentine, Christmas trees, maple Syrup, and other forest products. Americans use 5,129 articles made from wood—and the list is growing.

To get an idea of how profitable tree farming really is, we have only to look at two or three cases from the records of the American Forest Products Industries:

• In 1947 a Georgia man bought 825 acres of badly worn land, using wartime savings for the down payment. Improvement thinnings helped further with the initial financing. When his first daughter was born, he was unable to take out college insurance. So he planted 47,000 slash pine seedlings as a sort of insurance he could handle. Two years later he was able to buy an adjacent 303 acres, which he planted with 150,000 pine seedlings. In 1953 he marketed inferior trees and started working them for gum and naval stores. This source alone will pay him about $1,500 a year. In about eight years his daughter will be ready for college and by that time a major portion of the trees will be marked for sawtimber harvest.

• A northeastern tree farmer has averaged $750 per year for the past 14 years from sales of sawlogs, pulpwood and fuel off his 150-acre woodlot. One year's production of sawlogs from the farm forest provided sufficient lumber to build a new barn. A typical year's harvest includes 30 cords of fuel, 11 cords of pulpwood and 10,000 board feet of fine sawlogs.

• A West Coast tree farmer and dairyman has had three sawlog harvests in eight years off a 30-acre tract of Douglas fir. The trees were cut according to a management plan. The first harvest in 1944 provided 9,000 board feet of lumber for farm buildings. Three years later the tree farmer harvested 42,000 board feet that provided lumber for a barn and two silos. A third harvest of 55,000 board feet has been made since that time. A vigorous stand of high quality trees now growing on the land assures plenty of wood for future harvests.

By D. R. Paterson
Department of Horticulture
Texas A & M College

and

By J. M. Coruthers
Agricultural Economics
Prairie View A & M College
Texas

Dr. D. R. Paterson, a New York state native, is Associate Horticulturist with the Texas Agricultural Experiment Station. He works with plant nutrition of vegetable crops over the state. He earned his B.S. in Agriculture at Cornell, his M.S. in Truck Crops at University of California, his Ph.D. in Horticulture at Michigan State. He was assistant agent of Madison County, New York, before joining the Texas Station nearly 5 years ago.

Dr. J. M. Coruthers, Texas native, is Professor of Agricultural Economics at Prairie View A&M College where he has taught and done research in Agricultural Economics and Horticulture for 20 years. He earned his B.S. in Agriculture at Hampton Institute, his M.S. in Dairy Science at the University of Wisconsin, his Ph.D. in Agricultural Economics at Cornell. He taught at Southern University for 3 years, directed agriculture at Arkansas State College for 8 years.

Fertilizer and Starter Solutions Affect Sweet Potatoes . . .

DURING the past two decades, starter solutions have been used to increase the early yield of such diverse crops as tomatoes (4, 7, 9), cabbage (8), sweet potatoes (12), and nursery and florist crops (1).

For many sections of the sweet-potato-producing areas along the Gulf and Atlantic Coasts of the United States, more than 1,000 pounds of a 4-8-12 NPK fertilizer or its equivalent commonly recommended for the production of a commercial crop of sweet potatoes (2, 5, 12, 13). Particular emphasis is usually placed on the use of a high potassium percentage in the mixed fertilizer (10, 11) for optimum sweet potato production.

In 1953 at Hearne and Milano, Texas, and in 1955 at Prairie View, Texas, starter solutions were interacted with various fertilizer combinations in order to evaluate the responses of sweet potatoes to both starter solutions and fertilizer in South Central Texas.

Experimental 1953

The design of the experiment was a 2 x 2 x 3 complete factorial split plot with four replications at two locations.

The main plots or fertilizer treatments included all possible combinations of nitrogen at 40 and 80 pounds per acre from 33.5% ammonium ni-

Fig. 1. A significant increase in the yield of Gold Rush sweet potatoes came when a 10-52-17 fertilizer was added to the water used in transplanting the sweet potato slips.

. . . In South Central Texas

trate; phosphoric acid at 40 and 80 pounds per acre from 20% superphosphate; and potash at 80, 120, and 160 pounds per acre from 60% muriate of potash.

Half of the nitrogen and all of the phosphoric acid and potash were applied in bands approximately six inches deep on either side of a planting bed on March 25 at Milano and on April 13 at Hearne. The remainder of the nitrogen was applied as a side-dressing at both locations when the plants started to form vines.

Each main fertilizer plot consisted of three rows 32-feet long on 42-inch centers. These main plots were split lengthwise into three one-row sub-plots. Each sub-plot received one of the following treatments: (a) A control plot where sweet potato slips were set 16 inches apart in the row by a mechanical transplanter without water or a starter solution, (b) a plot where each sweet potato slip received approximately eight ounces of water automatically metered by the transplanter, and (c) a plot where each sweet potato plant received approximately eight ounces of a solution containing one pound of a 10-52-17 analysis fertilizer in 50 gallons of water at Milano and three pounds of 10-52-17 analysis fertilizer in 50 gallons of water at Hearne.

Porto Rico sweet potato slips were

set into the field April 1 at Milano just after a half-inch rain. The plants grew vigorously until the seasonally dry weather late in June retarded their growth. Similarily, sweet potato slips were planted May 20 at Hearne where they made a limited amount of growth during the hot, dry summer but responded to rains in late September and early October.

The potatoes were harvested at Milano on October 29 and at Hearne on November 9 and the yields of U.S. No. 1, U.S. No. 2, and cull sweet potato roots were recorded.

As indicated by soil tests, the Bowie fine sandy loam soil at both Hearne and Milano was low to low-medium in nitrogen, very low to low in phosphoric acid, and very low in potash.

Results

There were no significant increases in the yield of sweet potato roots above the basic application of 40 pounds per acre of nitrogen and phosphoric acid and 80 pounds per acre of potash at either Hearne or Milano. These results are similar to those obtained by Hutson in a 4-year sweet potato fertilizer trial at Nacogdoches, Texas (3).

The data (Table I) for Milano show that the use of eight ounces of 10-52-17 starter solution resulted in highly significant increases in the total yield of sweet potato roots over the control and water treatment. The yield of U.S. No. 1 roots was nearly doubled through use of the 10-52-17 starter solution at this location.

TABLE I.—THE GRADE AND YIELD OF TEXAS PORTO RICO SWEET POTATOES AS AFFECTED BY STARTER SOLUTION AT MILANO, TEXAS, 1953.

	No. 50 lb. boxes per acre			
	U. S. No. 1	U. S. No. 2	Cull	Total
Control.....	43	39	40	122 [1]
8 oz. water...	38	39	37	114
8 oz. 10–52–17 solution....	77	62	59	198
Average.....	53	47	45	145

1. Least difference necessary for significance between starter solution treatments:

5%	14
1%	19

The data (Table II) for Hearne show that the use of eight ounces of water per plant applied at transplanting resulted in a highly significant increase in the total yield of sweet potato roots. Additional highly significant increases in total yield were obtained by the use of the 10-52-17 starter solution.

As indicated in Table II the use of 80 pounds per acre of nitrogen resulted in a significant decrease in the yield of sweet potatoes at Hearne. There was no significant reduction in plant stand due to the use of either the fertilizer or starter solution treatments at either of the two locations.

Experimental 1955

At Prairie View, two starter solution treatments, i.e., water and a solution of three pounds of a 10-52-17 fertilizer dissolved in 50 gallons of water, were interacted with a 3 x 3 x 3 NPK factorial fertilizer experiment. The solutions were applied by a mechanical transplanter that delivered approximately eight ounces of solution to each plant as they were transplanted into the field. Approximately 40 pounds per acre of 10-52-17 fertilizer were applied in this manner with the starter solution.

Each starter solution plot was 288-feet long by three 42-inch rows wide and was replicated three times in a randomized block design. These main or starter solution plots were split into 27 single row plots 32-feet long which received all possible combinations of nitrogen at 20, 40, and 60 pounds per acre from 33.5% ammonium nitrate; phosphoric acid at 40, 80, and 120 pounds per acre from 20% superphosphate; and potash at 40, 80, and 120

pounds per acre from 60% muriate of potash. All of the fertilizer was applied on April 28, 1955, as a side-dressing application 10 days after Gold Rush sweet potato slips were transplanted into the field with their appropriate starter solution treatment.

The Gold Rush sweet potatoes were harvested on October 10, and the yield of U.S. No. 1, U.S. No. 2, Jumbo, and Cull grades of roots were recorded.

Soil tests indicated the Hockley fine sandy loam soil at Prairie View contained approximately 35 pounds of nitrogen (N), 22 pounds of phosphoric acid (P_2O_5), 106 pounds of potash (K_2O), and 400 pounds of calcium (CaO) per acre before the addition of commercial fertilizers.

At all three locations involved in this study, the fertilizer was applied with a modification of the precision fertilizer distributor described by Rea, et al. (8).

Results

As indicated in Table III, there was a significant increase in the yield of Gold Rush sweet potatoes when a 10-52-17 fertilizer was added to the water used in transplanting the sweet potato slips (Fig. 1). Over 60% or 45 boxes per acre of this increase in yield occurred in the marketable grades of sweet potato roots (Table III).

When nitrogen, phosphoric acid, and potash were used at an optimum rate of 20-120-120 pounds of NPK in this experiment, the use of the 10-52-17 starter solution increased the total yield of sweet potatoes by over 200 boxes per acre. Over 100 boxes per acre of this increase occurred in the marketable grades of sweet potatoes (Table III).

When nitrogen was increased from 20 to 40 pounds per acre, a slight decrease in the yield of sweet potatoes

TABLE II.—THE GRADE AND YIELD OF TEXAS PORTO RICO SWEET POTATOES AS AFFECTED BY A STARTER SOLUTION AND NITROGEN AT HEARNE, TEXAS, 1953.

Starter solution treatment at planting	Pounds per Acre N	No. 50 lb. boxes per acre			
		U. S. No. 1	U. S. No. 2	Cull	Total
Control	40	186	76	100	362
Control	80	166	66	101	333
Average		176	71	100	347
8 oz. water	40	200	91	95	386
8 oz. water	80	183	83	94	360
Average		192	87	94	373
8 oz. 10–52–17	40	213	89	119	421
8 oz. 10–52–17	80	177	72	126	375
Average		195	80	123	398

L.S.D.	Starter solution	Nitrogen
5%	16	34
1%	21	N.S.

TABLE III.—THE GRADE AND YIELD OF GOLD RUSH SWEET POTATOES AS AFFECTED BY A STARTER SOLUTION AND FERTILIZER AT PRAIRIE VIEW, TEXAS, 1955.

Pounds Per Acre			No. 50 Lb. Boxes Per Acre									
			Starter solution treatments at planting									
			8 oz. 10–52–17 starter solution					8 oz. water				
			Grade					Grade				
N	P_2O_5	K_2O	U. S. No. 1	U. S. No. 2	Cull	Jumbo	Total	U. S. No. 1	U. S. No. 2	Cull	Jumbo	Total	Average
20	40	40	76	99	99	57	331	95	60	74	86	315	323
20	40	80	77	131	121	85	414	109	49	77	70	305	360
20	40	120	92	147	86	111	436	77	117	137	70	401	419
20	30	40	67	146	116	110	439	76	91	100	98	365	402
20	80	80	68	126	110	133	437	47	110	132	86	375	406
20	80	120	88	161	122	122	493	71	120	132	52	375	434
20	120	40	74	94	110	141	419	49	117	170	85	421	420
20	120	80	52	124	108	146	430	56	133	121	126	436	433
20	120	120	105	200	173	151	629	53	146	114	110	423	526
40	40	40	92	106	139	38	375	63	81	115	82	341	358
40	40	80	71	134	123	107	435	54	99	99	56	308	372
40	40	120	77	137	125	126	465	80	101	89	104	374	420
40	80	40	47	122	121	90	380	58	126	86	55	325	353
40	80	80	60	78	117	136	391	69	95	121	112	397	394
40	80	120	70	247	97	136	550	51	103	99	149	402	476
40	120	40	61	142	135	54	392	58	119	85	111	373	383
40	120	80	72	175	104	141	492	63	110	108	103	384	438
40	120	120	68	143	79	196	486	68	97	128	125	418	452
60	40	40	63	170	124	70	427	61	96	90	30	277	352
60	40	80	54	163	106	74	397	65	65	88	47	265	331
60	40	120	60	69	89	149	367	84	91	78	114	367	367

| | | |

of Texas Porto Rico sweet potatoes at both Hearne and Milano, Texas, in 1953 and in a significant increase in the yield of Gold Rush sweet potatoes at Prairie View in 1955.

No significant increases in the yield of sweet potatoes were obtained above a basic application of 40 pounds per acre of nitrogen and phosphoric acid and 80 pounds per acre of potash at Hearne and Milano in 1953. At the Hearne location, the use of 80 pounds per acre of nitrogen gave a significant decrease in the yield of sweet potatoes.

At Prairie View in 1955, highly significant increases in the yield of Gold Rush sweet potatoes were obtained up to 120 pounds per acre of phosphoric acid and potash. A significant decrease in the yield of the Gold Rush variety was observed when 60 pounds per acre of nitrogen were applied at this location.

Literature Cited

1. Carrier, L. E. and Snyder, W. E. The effect of a starter solution on several nursery and florist crops. Proc. Amer. Soc. Hort. Sci. 55:513. 1950.
2. Geise, F. W. Fertilizer studies and the production of sweet potatoes. Maryland Agr. Exp. Sta. Bul. 311. 1929.
3. Hutson, H. C. and Paterson, D. R. Some effects of different amounts and combinations of fertilizers on the yield and market grade of sweet potatoes at Nacogdoches. Tex. Agr. Exp. Sta. Prog. Report. No. 1711. 1954.
4. Jones, L. G. and Warren, G. F. The efficiency of various methods of application of phosphorus for tomatoes. Proc. Amer. Soc. Hort. Sci. 63:309-319. 1954.
5. Leonard, O. A., Anderson, W. S., and Gieger, M. Field studies on the mineral nutrition of the sweet potato. Proc. Amer. Soc. Hort. Sci. 53:387-382. 1949.
6. Paterson, D. R. and Williams, J. C. Preliminary studies of the effects of sulphur on the yield of Granex onions. 53rd. Proc. Assn. Southern Agr. Workers. 164. 1956.
7. Rahn, E. M. A summary of starter solution experiments on tomatoes and cabbage at State College, Pa., Proc. Amer. Soc. Hort. Sci. 41:305-309. 1942.
8. Rea, H. E., Hulburt, W. C., and Adams, J. E. A multiple-cell, belt type distributor for the use with tractor implements in fertilizer tests with field crops. Proc. Soil Sci. Soc. of America. 14:391-395. 1950.
9. Sayre, C. B. Use of nutrient solutions and hormones in the water for transplanting tomatoes and effect on earliness and total yields. Proc. Amer. Soc. Hort. Sci. 38:489-495. 1941.
10. Scott, L. E. Potassium uptake by the sweet potato plant. Proc. Amer. Soc. Hort. Sci. 56: 248-252. 1950.
11. Scott, L. E. and Ogle, W. L. The mineral uptake by the sweet potato. Better Crops With Plant Food Magazine, Vol. 36, No. 8:12-16. 1952.
12. Tiedgens, V. A. and Schermerhorn, L. G. Sweet potato investigations in New Jersey. New Jersey Agr. Exp. Sta. Bul. 697:1-19. 1942.
13. Zimmerly, H. H. Sweet potato fertilizers, Virginia Truck Exp. Station Bul. 66. 1929. ◄◄◄

AN IMPORTANT POUND

The pound of earth you take to your county agent for a soil test can be the most important part of your farm, according to Charles Painter, Idaho's Extension Soils Specialist.

What you learn from that soil sample may be the key to the health of your land, the difference between financial profit and loss.

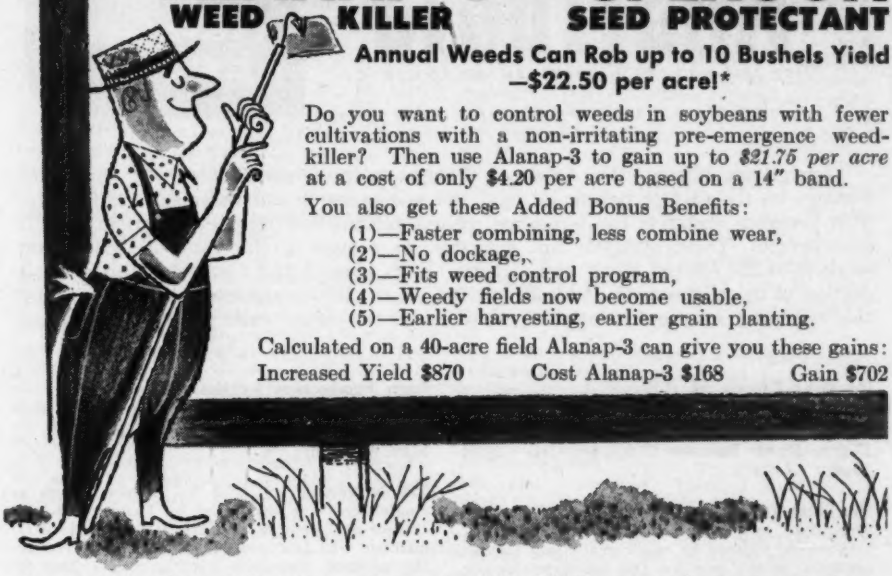
Getting a soil sample is as easy as digging fish worms. The low cost of the soil test is only a tiny fraction of what the test may save you.

County agents can assist farmers in learning how to secure a soil sample. Tests are also handled through the agent's office.

Idaho Agricultural Science

SOYBEAN GROWERS! GAIN UP TO $870 EVERY 40 ACRES

WITH ALANAP®-3 WEED KILLER AND SPERGON® SEED PROTECTANT



Annual Weeds Can Rob up to 10 Bushels Yield —$22.50 per acre!*

Do you want to control weeds in soybeans with fewer cultivations with a non-irritating pre-emergence weed-killer? Then use Alanap-3 to gain up to *$21.75 per acre* at a cost of only $4.20 per acre based on a 14" band.

You also get these Added Bonus Benefits:

(1)—Faster combining, less combine wear,
(2)—No dockage,
(3)—Fits weed control program,
(4)—Weedy fields now become usable,
(5)—Earlier harvesting, earlier grain planting.

Calculated on a 40-acre field Alanap-3 can give you these gains:
Increased Yield $870 Cost Alanap-3 $168 Gain $702

At the same time, order your soybeans treated with Spergon—the best protectant against "damping off" and other fungus diseases so rampant in cold, wet planting weather. *Or* order your Spergon early and treat the seed yourself.

Here are the economics of Spergon-treating enough seed to plant a 40-acre soybean field:

You can get a minimum gain of 2 bushels per acre increased yield from Spergon-treated seed. Many growers report increases up to 6 bushels per acre. Assuming only a 2-bushel increase worth $2.25 a bushel (or $4.50 gain per acre) with a cost for Spergon of only 30 cents per acre providing a net gain of $4.20 per acre.*

Calculated on a 40-acre field, Spergon can give you the following gains:
Increased Yield $180 Cost Spergon $12 Gain $168

Now look at your total possible gain from use of Spergon-treating and Alanap-3 weed control:

Gains 40-acre field

Alanap-3	Increased yield	$870	Cost of	Alanap-3	$168	Gain	$702
Spergon	" "	180	" "	Spergon	12	"	168
	Yields	$1050		Cost	$180	"	$870

Total possible combined gain—$870 per 40 acres or $21.75 per acre. Order your Alanap-3 and Spergon early. Send for your free copies of booklets giving full information on use. OR visit your nearest dealer.

* "Current price average!"

United States Rubber

Naugatuck Chemical Division

Naugatuck, Connecticut

producers of seed protectants, fungicides, miticides, insecticides, growth retardants, herbicides: Spergon, Phygon, Aramite, Synklor, MH, Alanap, Duraset.

Abstracts

1102 16th STREET, N. W. WASHINGTON, D. C.

FROM THE AMERICAN POTASH INSTITUTE LIBRARY SERVICES

Through its library, the American Potash Institute summarizes the important findings on the role of potash in good soil management and balanced soil fertility. This program abstracts the important potash information from each article that is summarized. These abstracts are available on request to professional agricultural workers of the United States and Canada. Each issue *Better Crops* features a small portion of the abstracts available in current issues. If you are interested in receiving this summary service regularly in complete issues, please write the above address.

Residual Effects of P-K

Pesek, J. and Dumenil, L.

An extra dividend from fertilizer use. Plant Food Review 2(3):4-6, 31. Fall 1956.

The residual effects of P and K have long been recognized in practice. The liberal P and K treatments applied to small grain and legume seedings largely are for the following legume meadow. It is the residual P and K in the second or hay year which is depended upon to supply the meadow crop with adequate nutrients. The residual effect of K may not last as long as for P. This is especially true on the light soils which are quite low in available K. It has been observed on a sandy loam in Iowa that a legume may remove ¾ of a 60-lb. application of K in only one year. This means that K probably needs to be applied again for the second year of meadow and for the individual crops in the succeeding years. It is to be expected that the residual P and K will be greater following grain crops than following legume crops.

Forest Fertilization Potential

Forest fertilization. Jour. Agrl. and Food Chem. 4(10): 827-828. Oct. 1956.

Fertilization of large forest acreages—plantation acreages—may be closer than at first apparent. It appears to be about where range fertilization was 3 to 5 years ago—just about to shift from college research to larger scale commercial experiments. Allied's Nitrogen Division in cooperation with Rutgers sponsored studies in N. J. Results obtained after 5-year experiment indicate excellent growth response from forest fertilization. The pulp growing cycle may be reduced by several years by proper fertilization. An increase in wood volume of 40 to 65% is foreseen. Some 600 million acres of forests in the U. S. can probably profit from fertilizers, and some foresters put average needs in the 500-to-800-pounds-per-acre range with a 10-10-10 or 12-12-12 grade.

Corn Production by the Champ

Lamar does it again—Harvests 257 bu. corn from one acre. Croplife 3(45):1, 5. Nov. 5, 1956.

The harvesting of 257.1 bu. of corn from a single acre was completed by Lamar Ratcliff, 17-year-old Printiss County, Mississippi, 4-H member who has been recognized since 1952 as the nation's champion corn grower. This is 47 bu. less than the record yield of 304 bu. made in 1955. The fertilizer program followed is given in detail. About three weeks before planting, Lamar placed 1,000 lb. of 14-14-14 and 500 lb. of ammonium nitrate 16 to 18 inches deep beneath the furrow. At planting he applied another 300 lb. of 14-14-14 and 200 lb. ammonium nitrate.

Trees Respond to Fertilizer

Henderson, W. N.

Fertilizers find market in forests. Journal of Commerce, p. 12. Nov. 20, 1956.

The chemical industry has a new marketing opportunity—fertilizing forests for greater wood production. Research at Washington State has shown that N can increase tree growth by 40 to 65%. Trees fertilized with K_2O by researchers at N.Y. State Univ. registered gains in growth up to double that of unfertilized trees. Complete, N-P-K, fertilizers have also been tested with marked success. Methods of fertilizer application are discussed.

Ornamentals—Gravel Culture

Kiplinger, D. C.

Growing ornamental greenhouse crops in gravel culture. Ohio Agr. Exp. Sta. (Wooster). Spec. Cir. 92, pp. 18, 22-24. Sept. 1956.

Nutrient elements are supplied to ornamental crops grown in gravel culture in solution form. Many different formulas have been ad-

vocated by various workers but the differences between them are not great. Two solutions are presented which have proved satisfactory on many crops. Potassium is supplied in these formulas by either KNO_3 or KCl. Nutrient solution tests for N and K should be made every other week after changing of the solution.

Pastures—Animal Excreta

Petersen, R. G., Woodhouse, W. W., Jr., and Lucas, H. L.

The distribution of excreta by freely grazing cattle and its effect on pasture fertility: II. Effect of returned excreta on the residual concentration of some fertilizer elements. Agronomy Journal 48: (10): 444-449. Oct. 1956.

Data indicate that freely grazing animals distribute fertilizers inefficiently, the degree varying with size of the area effectively fertilized by each excretion and with the rate of loss of each element after application. The greatest benefit from excretal return of such elements as P and K appears to be under conditions of high stocking rate and long periods of grazing time. Reliable values for such factors as effective area fertilized per excretion and rate of nutrient loss are needed to estimate the effect of grazing animals on the fertility status of a pasture. Tables are given.

Nemec, A.

Zur Kenntnis der Kali- und Magnesiamangelerscheinungen bei Sämlingen und Kulturen der Kiefer. Forstwiss Centralbl. 64(7):160-166. 1942. *Abs.* Biol. Abs. 17(9):22467. Nov. 1943.

Foliage of pine seedlings in nurseries often has a peculiar coloring, especially in fall and spring, which is caused by nutrient deficiencies. Anal. of green and yellow-tipped needles showed more ash in the green needles, little dif. in N, CaO and P_2O_5 content, but considerably less K_2O and MgO and considerably more Mn_2O_3 in yellow-tipped needles. Soil was deficient in K_2O and MgO.

Nemec, A.

Biochemical investigation of the death of abies in the Purglitz Forests of Bohemia. Lesnicka Prace 19(6/7):325-352, 1940. *Abs.* Biol. Abs. 15:13411. 1941.

The soil beneath a dying 40-yr.-old stand of Abies alba was studied from the standpoint of its relation to requirements of the fir. It was highly acid, hence deficient in Ca. There was an adequate supply of easily soluble P_2O_5, a moderate amt. of available K_2O in the upper 10 cm. but insufficient in the 10-50 cm. layer. There were fair amts. of soluble Mn and Al compounds in the top 40 cm. Needles of dying firs had much less K_2O but more Ca, Mn, and SiO_2 than those of normal fir. The sickness and death of the trees appears to be connected with deficiency in K_2O.

Lunt, H. A.

Effect of fertilizer treatment on field-planted spruce. Soil Sci. Soc. of Amer. Proc. 10:406-409. 1945.

White spruce and Norway spruce, 2-1 nursery stock, were planted in field and measured at intervals to determine effect of previous fertilizer treatment in nursery and fertilization at time of field planting on subsequent growth and survival. Some of rates used were 12-4-4, 4-12-4, 4-4-12, and 8-8-8 at 400, 1200 and 2000 lb. in nursery, and 7-10-3 and 6-10-4 in field.

Heiberg, S. O., Stone, E. L., and White, D. P.

Potash and magnesium fertilization of young pine and spruce trees. N. Y. State Univ., Col. Agr. and Col. Forestry (Syracuse) Unno. Pamph., 8 p. 1954.

The most frequent cause of poor growth and discoloration of young evergreen trees grown in the Adirondacks is a lack of avail. K and Mg in the coarse-textured soils. When K alone is lacking, height and shoot growth is greatly reduced. Appln. of K and Mg, when needed, produce marked benefits in growth, needle color and appearance. Trees up to 2 ft. in height can be treated with KCl at rate of 2 oz. per tree (half a handful) or with 4 oz. of Epsom salts. For large plantings, KCl may be applied at rate of about 200 lb. per acre, or Epsom salts at 300 lb. per acre. Sulphate of potash-magnesia appln. rates should be around 300 lb. per acre. These applns. will normally be effective for 5 yr. or more. The use of complete fert. (5-10-5, 10-10-10) on new plantings should be avoided when grass or weeds are present. These plants are stimulated to rapid growth and compete more strongly with the evergreens.

McComb, A. L. and Kapel, F. J.

Effect of subsoil and fertility on the growth of seedling black locust and green ash. Plant Physiol. 17(1):7-14. Jan. 1942.

One-yr-old seedlings of black locust and green ash showed tremendous response to NPK at all pH levels at the end of 5 months, but very little response to N and K, indicating that P was the element limiting growth most. K is apparently adequate at the level of P and N existing in the original soil. Practical value of fertilizing seedlings when reforesting badly eroded sites of this particular soil series was indicated.

Hubert, H.

La fumure des peupliers. Potasse 13:120, p. 58. April 1939.

Over a period of 7 yrs. trees fertilized were 1/3 larger than unfertilized, and had less knotty wood. Fertilizer was 8-13-19 at 2.2 lb. per tree. One year, 1 lb. of 0-15-30 was used instead, but growth was not so good in all cases.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soil, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

SOILS

"Science Service Laboratory, Rpt. 1951-1956," Univ. of Western Ont., London, Ont., Can.

"Crop Production, 1956 Annual Summary, Acreage, Yield, and Production of Principal Crops by States with Comparisons," USDA, Wash., D. C., Dec. 17, 1956.

"Biennial Report of the Department of Agriculture of the State of Oregon, 1954-56, Dept. of Agr., Corvallis, Ore.

"Agronomy Guide—Crops, Varieties, Fertilizers, Lime—1957," Agr. Ext. Serv., Penn. State Univ., University Park, Penna.

"Welcome to Substation No. 19, Crystal City, Texas," Agr. Exp. Sta., Texas A & M College, College Station, Texas, MP-187, Dec. 1956.

CROPS

"Alfalfa Production in Alabama," Agr. Exp. Sta., Alabama Polytechnic Institute, Auburn, Ala., Bul. 300, Oct. 1956, D. G. Sturkie and C. M. Wilson.

"Arizona Home Gardening," Agr. Ext. Serv., Univ. of Ariz., Tucson, Ariz., Ext. Cir. 130, H. F. Tate.

"Growing Onions in Arizona," Agr. Exp. Sta., Univ. of Ariz., Tucson, Ariz., Bul. 280, Oct. 1956, W. D. Pew.

"Seed Crops of Forest Trees in the Pine Region of California," USDA, Wash., D. C., Tech. Bul. 1150, Aug. 1956, H. A. Fowells and G. H. Schubert.

"Dwarf Fruit Trees, Selection and Care," USDA, Wash., D. C., Lflt. 407, Oct. 1956.

"Sweetclover," USDA, Wash., D. C., Lflt. 23, Rev. Oct. 1956, E. A. Hollowell.

"Sweet Potato Production Guide," Agr. Ext. Serv., Univ. of Fla., Gainesville, Fla., Cir. 97B, Dec. 1956.

"Gator Rye," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Cir. S-94, Nov. 1956, W. H. Chapman, D. D. Morey, A. T. Wallace, and H. H. Luke.

"Florida 200, a New Yellow Field Corn Hybrid for North and West Florida," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Cir. S-95, Jan. 1957, E. S. Horner, W. H. Chapman, and H. W. Lundy.

"Grape Culture in Massachusetts," Agr. Ext. Serv., Univ. of Mass., Amherst, Mass., Ext. Leaf. 64, Apr. 1956, O. C. Roberts.

"Grow 20-Ton Sugar Beets," Ext. Serv., Mont. State College, Bozeman, Mont., Bul. 292, May 1956, H. L. Dusenberry.

"Grow Quality Sweet Potatoes," Agr. Ext. Serv., N. C. State College, Raleigh, N.C., Rev. Ext. Cir. 353, H. M. Covington, D. T. Pope, H. Garriss, L. W. Nielsen, W. A. Jackson, H. E. Scott, C. Brett, and G. Abshier.

"1956 Hybrid Corn Field Trials," Agr. Exp. Sta., N. D. Agr'l. College, Fargo, N. D., Agron. Mimeo, Cir. 91, Jan. 1957, W. Wiidakas, R. E. Teschendorf, and L. A. Jensen.

"Birdsfoot Trefoil in the Red River Valley," Agr. Ext. Serv., N. Dak. Agr. College, Fargo, N. Dak., Cir. A-257, May 1956, J. F. Carter.

"Potatoes in North Dakota," Agr. Ext. Serv., N. D. Agr'l. College, Fargo, N. D.

"4-H Legume Manual," Agr. Ext. Service, Okla. A. & M. College, Stillwater, Okla., Cir. 400, W. Chaffin.

"The Home Vegetable Garden," Agr. Ext. Serv., Penna. State Univ., University Park, Penna., Cir. 469, R. F. Fletcher and J. O. Dutt.

"Cultivation and Concord Grape Production," Agr. Exp. Sta., Penna. State Univ., University Park, Penna., Bul. 616, Jan. 1957, H. K. Fleming and R. B. Alderfer.

"Date and Rate of Corn Planting," Agr. Exp. Sta., S. D. State College, Brookings, S. D., Bul. 455, Mar. 1956, A. N. Hume, V. A. Dirks, and D. B. Shank.

"Farmers' Experience with Grass Silage," Agr. Exp. Sta., S. D. State College, Brookings, S. D., Cir. 126, Apr. 1956, R. R. Newberg and R. H. Kruse.

"South Dakota Corn Performance Tests, 1956," Agr. Exp. Sta., S. D. State College Brookings, S. D., Cir. 134, Feb. 1957, D. B. Shank, D. E. Kratochvil, and R. A. Moore.

"Early and Delayed Grazing on Orchardgrass, Alfalfa, Ladino Clover, Pastures," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Bul. 249, Sept. 1956, A. G. Van Horn, W. M. Whitaker, and R. H. Lush

"Corn Yield Trials in the Lower Rio Grande Valley, Spring 1956," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, Prog. Rpt. 1897, Oct. 1956, W. R. Cowley and G. W. Otey.

"Bronco, A New Winter-hardy, High-yielding Oat Variety for Texas and Other Southern States," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, L-309, Oct. 1956.

"Weshaven, A Disease-resistant Tomato for South Texas," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, L-328, Jan. 1957.

"Report of Progress in Research, Southern Indiana Forage Farm," Agr. Exp. Sta., Purdue Univ., Lafayette, Ind., ID-9, May 1956.

"Cotton Variety Test, U. S. Cotton Field Station, Greenville, 1956," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, Prog. Rept. 1927, D. D. Porter.

"Upland Cress, Vegetable Production Series," Agr. Exp. Sta., Va. Polytechnic Institute, Blacksburg, Va., Cir. 697, July 1956, F. H. Scott.

"Potatoes, Vegetable Production Series," Agr. Exp. Sta., Va. Polytechnic Institute, Blacksburg, Va., Cir. 700, Sept. 1956, A. V. Watts and L. B. Wilkins.

"Producing Grass Seed in Washington," Agr. Ext. Serv., State College of Wash., Pullman, Wash., Ext. Misc. Pub. 41, Aug. 1956, J. K. Patterson, J. L. Schwendiman, A. G. Law, and H. H. Wolfe.

"Results of Hybrid Corn Yield Trials in West Virginia, 1956," Agr. Exp. Sta., W. Va. Univ., Morgantown, W. Va.

"Winter Barley Variety Trials in West Virginia, 1949-1955," Agr. Exp. Sta., W. Va. Univ., Morgantown W. Va., Bul. 392, Aug. 1956, C. Veatch.

"'Mums' for Fall Beauty," Agr. Ext. Serv., Univ. of Wis., Madison, Wis., Cir. 532, Oct. 1956, L. M. Berninger and G. E. Beck.

"Vegetable Varieties for Wisconsin, 1957," Agr. Ext. Serv., Univ. of Wis., Madison, Wis.

FERTILIZERS

"Wheat Fertilization Studies in Western Oklahoma, Progress Report, 1954-1955," Agr. Exp. Sta., Okla. A. & M. College, Stillwater, Okla., Mimeo. Cir. M-281, Oct. 1956, H. V. Eck and B. A. Stewart.

"Summary Inspection Report of Official Samples on Seed, Feed, & Fertilizer, 1955-56 Fiscal Year, Oklahoma," State Brd. of Agr., Oklahoma City, Okla.

"Fertilization and Seedbed Preparation for Pasture Improvement in Southeast Texas," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, Prog. Rpt. 1918, Jan. 1957, E. D. Cook, R. P. Bates, and J. R. Wood.

"Irrigated Cotton Fertilizer Trials, High Plains of Texas, 1955," Agr. Exp. Sta., Texas A. & M. College, College Station, Texas, Prog. Rpt. 1919, Jan. 1957, E. L. Thaxton, Jr. and H. J. Walker.

"Fertilizer Recommendations for the East Texas Timbers," Agr. Ext. Serv., Texas A. & M. College, College Station, Texas, L-228, 1957, M. K. Thornton and P. R. Johnson.

"Fertilizer Tests with Burley Tobacco," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Bul. 252, Oct. 1956, B. C. Nichols, D. R. Bowman, and J. E. McMurtrey, Jr.

"Cooperative Nutritional Status Studies in the Western Region, 1. Nutrient Intake," Agr. Exp. Sta., Utah State Agr. College, Logan, Utah, Bul. 383, E. B. Wilcox, H. L. Gillum, and M. M. Hard.

ECONOMICS

"Crop, Livestock and Marketing Review for 1955," State Dept. of Agr., Hartford, Conn.

"Tree Nuts by States, 1949-55, Revised Estimates, Production, Use, and Value," USDA, Wash., D. C., Stat. Bul. 195, Oct. 1956.

"1957 Agricultural Outlook Charts," USDA, Wash., D. C., Nov. 1956.

"Fruits-Noncitrus, by States, 1949-55, Revised Estimates, United States, 1934-55, Production, Use, and Value," USDA, Wash., D. C., Stat. Bul. 192, Sept. 1956.

"Washington Vegetable Crops, Data for 1939-1955," State Dept. of Agr., Olympia, Wash., March 1956.

Shoeless, he climbed the stairs, opened the door of the room, entered, and closed it after him without being detected. Just as he was about to get in bed his wife, half-aroused from slumber, turned and sleepily said:

"Is that you, Fido?"

The husband, telling the rest of the story, said:

"For once in my life I had real presence of mind. I licked her hand."

• • •

Colored Minister—Brudders and sisters. Before de deacons starts around wid de collection baskets I desire to announce dat a recent letter from ouah missionaries in Africa recites dat dem heathens am already well supplied with pants buttons.

• • •

The clerk in the pet shop was showing the lovely old lady some dogs.

"You can have that smaller bitch over there," he pointed, "for $25 or the larger bitch here for $30."

The lovely old lady shrunk back.

"But, madam," said the clerk, "you surely have heard the term 'bitch.'"

"Oh, certainly," replied the lady with dignity, "but never before have I heard it applied to dogs."

There was a great big spinster, a middle-sized spinster and a little bitta spinster. They came home one night and the great big spinster looked in her room and said, "Somebody's been sleeping in my bed." The middle-sized spinster took a look and cried, "And somebody's been sleeping in my bed." Then the little bitta spinster looked in her bed and said, "Goodnight, girls."

• • •

An old hillbilly and his wife went to the city on business. Since they had never stayed overnight in a hotel, they decided on the most swanky one in the city. They were shown to their room.

A television set was turned on when they entered, so they sat down and enjoyed the show very much for a while.

Then the old man became angry and shouted to his wife, "Maw, tell those show people to get away from our window so I can undress and go to bed."

• • •

Wife: "Jim, I'm ashamed of how we live. Papa pays our rent money . . . Aunt Jenny buys our food . . . my sister gives us clothes money. I'm certainly sorry we can't do better than that."

Husband: "You ought to be. You got two uncles that don't send us a nickel."

PUNCH FOR THE MONTH: Are we what we are because of who we are . . . or who we are because of what we are?

Borate your Fertilizers

FOR CUSTOMERS IN THE AREAS SHOWN

for Insurance

SUPPLY REQUIRED BORON...

for Economy

CHOOSE FERTILIZER BORATE... THE MOST ECONOMICAL SOURCE OF BORON...

For quality, yield and stands of...

FIELD CROPS
Alfalfa, clovers, cotton, tobacco, etc.

FRUITS AND NUTS
Apples, citrus, pears, nuts, etc.

TRUCK AND VEGETABLES
Beets, broccoli, celery, cauliflower, etc.

For...

1. Complete Fertilizers
2. Granulated Fertilizers
3. Granular Blends
4. Liquid Fertilizers
5. Borated Gypsum and other Fertilizer Materials

Plant Food Department Offices

AUBURN, ALA.
First National Bank Bldg.
COLUMBIA, MO.
P.O. Box 236
KNOXVILLE, TENN.
6105 Kaywood Drive
PORTLAND, OREGON
1504 N.W. Johnson St.

United States Borax & Chemical Corporation
PACIFIC COAST BORAX COMPANY DIVISION
630 SHATTO PLACE, LOS ANGELES 5, CALIFORNIA
100 PARK AVENUE, NEW YORK CITY, NEW YORK

EDUCATIONAL SERVICES

AMERICAN POTASH INSTITUTE

3 Four sets of color slides—on Successful Alfalfa, Soil Fertility and Soybeans, Potassium Hunger Signs, and Potash Production—are now being offered for loan and for sale by the Institute. They feature steps toward successful alfalfa, new concepts of producing soybeans, some effects of potash hunger on major crops, modern mining and refining of potash. See page 34 for details.

2 A new abstracts service, summarizing important findings on the role of potash in good soil management, was launched last month by the Institute. Complete issues of these summaries are available to professional agriculture workers in the United States and Canada. Each month Better Crops features a small portion of the current abstracts. For complete details, see pages 44-45.

1 For sometime now, this magazine has featured color covers emphasizing deficiency symptoms in various crop and plant life. Electro plates of these covers are now available free to agricultural education groups desiring such color pictures for their publications. They are also available *at cost* to commercial organizations desiring them for the same purpose. Write the address below.

Better Crops with PLANT FOOD

IF NOT DELIVERED, return to

AMERICAN POTASH INSTITUTE, INC.
1102—16th St., N. W., Washington 6, D. C.
RETURN POSTAGE GUARANTEED

Bulk Rate
U. S. POSTAGE
PAID
Washington, D. C.
Permit No. 2283